

BUSINESS PLANNING SERVICES

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Unilever Computer Services Limited

NEWS IN BRIEF

Home market 'in billions'

DEVELOPMENTS in home computers and video tape recorders could lead to the emergence of a new billion-dollar market for integrated Video Terminals which might eventually be dominated by companies like Texas Instruments and IBM rather than by current home computer and television manufacturers.

According to a study by the US consultancy International Resource Development Inc, the IRT will integrate the home telephone, TV set, personal computer and video tape recorder and will bring about significant changes in the publishing, consumer electronics, broadcasting and telecommunications industries.

The study, *The Home Terminal*, is published by International Resource Development Inc, of 125 Elm Street, P.O. Box 1131, New Canaan, Connecticut, 06840, USA.

Taxmen's fear

CONCERNED that a change in the tax collecting system and the introduction of computers may result in the loss of jobs and career paths for its members, the Inland Revenue Staff Federation is calling a special delegate conference next week. The federation says concentration of work at computer centres is resulting in loss of jobs in local offices and the federation wants to establish the right of its members to jobs resulting from transfer of workloads.

DEC double

A ONE Megabyte double density floppy disc subsystem has been introduced by Digital Equipment for use with PDP-8 and PDP-11 minicomputers.

Penny & Giles give paper tape punches the boot... Wigan housewife grateful for it!

Penny & Giles data cartridge direct function and low cost replacement for the paper tape punch has pleased Wigan housewife Hilda Birtwistle (32) who says she's very grateful.

Data Systems Designer Hilda tells us she's a data systems designer for the Cygnus deep space project and she was worried about house, show data rate, reel storage, and housing data but now that she has specified Penny & Giles 2700 ECMA-46 compatible mag tape store she has fully automatic loading, store capacity of 400k bytes (parallel), fully asynchronous serial or parallel data transfer, high data integrity and silent operation - so she's much happier. While she crooked the old man's tea Hilda wrote a recommendation to NASA because the interfaces on the Penny & Giles 2700 make it suitable for direct replacement in existing installations. They ought to know, she said.

Good luck with the housework Hilda

Penny & Giles Data Recorders Limited, Morden, Christchurch, Dorset, BH23 4AT. Telephone: Highcliff 04252 71511. Telex: 31266.

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GILB'S MYTHODOLOGY

Record level
hash totals
as a safety belt



THIS column introduces a fairly narrow idea, but then safety belts are narrow and they can still save lives.

The basic idea is simply that logical application records, such as those at the 01 Cobol level, must also contain a checksum which is usually a word of storage which is the binary sum of all other words in the record.

The checksum is recalculated whenever the record is updated and is available for re-checking at any time we want to verify the integrity of the record, in particular before any new update.

One of the few places I have seen this technique recently is in IBM's floppy disc control field specification. But it is absent from almost all texts on database and file design.

Even Gio Wiederhold's book "Database Design" (McGraw-Hill, 1977, 858 pp) does not mention it directly as far as I can see and only hints at a core buffer checksum.

The first time I saw it applied was in 1965 by IBM's software distribution centre in Paris, for the protection of records, which were operating systems in an 80 character format on tape.

After weeks of frustration in trying to generate operating systems from tapes which had

some sort of fault, one which was not detectable by parity checks, or any conventional check, IBM discovered that there was an 81st column on tape records and generated a record level hash total for each record.

When we got the tapes from Paris, we could immediately detect the presence of faulty records, and since we knew the exact record we could often get a Telex correction. Previously we only knew something was wrong and a new tape was dispatched from Paris.

This was dramatic in practice and from then on I became aware that there were a large number of file integrity studies which would benefit from the technique.

Certainly, today, I make it an early design specification in any file where reliability control is important and that covers almost all files.

Yet, to this day, neither IBM nor other manufacturers (please correct me if I'm wrong) teach this technique, or write about it, or even include it as an option in database management software, floppy discs excepted.

One reason why many people mentally discarded the technique was the cost of space and computation time for it, as opposed to their

reliability requirements.

The economics have changed dramatically and the use of secondary storage space and CPU cycles to protect centralised online database records seems like a much better trade-off now.

You cannot attempt immediate re-writes when you later detect an error but, on the other hand, you get error detection protection for the life of the record which is far more valuable than simple verification that the record seems to be OK the instant it was written.

In particular you get protection from software errors, both in your programs and the supplier software. There are already thousands of known bugs present in any large operating system in case you didn't know.

I can't go any deeper here but the idea is out in front of you. It is your responsibility to integrate this technique into your data protection design. It says so in IBM's software contracts and user manuals too.

I hope you will ask, as many of my students do: "Why didn't we learn about this long ago?"

PROGRAMMER NOTES

Micros challenge older techniques

TO anyone contemplating a change in career from working with mainframes to working with micros, the following notes may give more information on which to base a decision and, to anyone who has recently made the change, they may be instrumental in providing a shortcut to acquiring the relevant skills.

The main areas where it is likely that some education will be required are operating systems and their functions; and file access techniques.

Working on mainframes it is easy to forget how much the machine's operating system does for one, particularly when working in high level languages, which must surely be the highest probability for application programmers and analysts.

The kind of routines which may have to be developed include logical record input and output; memory initialisation; screen manipulations such as clears, roll-up, display in sections etc; data entry; buffering and unbuffering of packed data; print editing; and general error interception and recovery routines.

It is worth spending a lot of time to get these routines written efficiently, both in terms of operating speed and storage requirement, as the effort will be repaid in subsequent speed of application program development.

Reports should be concise and short, if they are produced automatically. Only those which users have specifically requested should include all the data which it is possible to provide. Strict standards should be developed for screen layouts and particularly data-entry positions. Ease of use must be the major consideration, and this tends in practice to mean ease of data entry.

System errors should be in-

tercepted and made clear to the user. This not only allows the user to overcome the problem in many instances, but also makes life easier for the backup team in more serious cases.

Control techniques should be developed to bring to the attention of the user the fact that data files are reading capacity, while he still has the opportunity to deal with the problem within the normal system.

Queues of batch jobs should be kept to a minimum. Untrained operators, which is what

most software people have been trained on mainframes and minis. The increasing use of the micro throws up new challenges to those schooled in the older techniques. Jack Schumann of Star Computer Centre provides some notes for the programmer about to embark on living with the micro.

most end users are, tend to be unconcerned about leaving the machine on its own for long periods, even switching off halfway through a run.

Reports should be concise and short, if they are produced automatically. Only those which users have specifically requested should include all the data which it is possible to provide.

In summary it is true to say that the difference between mainframes and micros is one of width of technique. One tends to have to do more to achieve the same result, but to have to do it efficiently to avoid using up the capacity of the machine or the patience of the user.

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SOFTWARE FILE

Structured programming is being increasingly used by the more progressive programming shops, but too many systems designers still rely largely on traditional rules of thumb.

As a contribution to increasing awareness of the need to improve system design techniques, Computer Weekly is starting next week a 10-part tutorial series on structured file and database design written by Max Stewart, divisional technical support manager of Leyland Vehicles. While technical manager for Leyland's Scottish central region, Stewart installed the

operating software for one of the UK's first IBM 360/32 SNA distributed database systems. In the series, Stewart will explain the underlying concepts of one of the most significant developments in database design, the relational database.

As a preview to the series and to place the significance of relational databases in terms of the real world of IBM marketing and product announcements, this week Stewart takes a peek into the future and predicts the likely impact of relational database systems on IBM's hardware and software in the 80s.

Analysing circular structures

SOFTWARE for civil engineering provided by bureau Shells, a program for analysing circular structures.

The effects of wind, temperature, settling, earthquakes and such on chimneys, cooling towers, curved box girder bridges, and similar structures can be ascertained in general terms before more detailed studies are made.

SIA claims there are virtually no restrictions on the size of problem that can be run. The bureau operates a CDC Cyber 72 front-ending a CDC 6600.

Value on Dutch market

OPERATIONS software products developed by Value Computing are to be introduced on to the Dutch market by its UK distributor RTZ Computer Services at an Amsterdam seminar on Value's Comput-A-Charge system. An enhancement to it will also be released.

Mystery surrounds DEC's Bliss-32 in UK

some OEMs may welcome it in the UK for writing things like RTL-2 compilers.

Few details of the language are yet available however and Arbat, the systems house which specialises in writing system and application software for banking and finance, while aware of the language, knew little about it.

DEC itself is firmly wedded to Bliss, despite some pressure from within the company to switch to the increasingly popular Bell Labs C language for writing system software.

Distillery contract

COMMERCIAL systems for a Honeywell Level 63 computer ordered by James Burrough Ltd are to be designed by Software Sciences. Management, order processing, and stock recording systems are the first applications required by the company, which distills Beefeater Gin and Borzoi Vodka.

How IBM database systems might look in the 1980s

"FORWARD into the 70s with IBM's virtual storage systems". This, as many readers will remember, was the general tenor of IBM's publicity when OS/VS and DOS/VS were announced in a blaze of sententious glory. Accepting the limitations of 1960s-vintage hardware, "human wave" programming teams (large was beautiful in those days) and a truly archaic job control language, they didn't turn out to be too bad after all. But IBM did not invent virtual storage, and our story could be repeated for many of IBM's less significant announcements.

The purpose behind this "dig" is to reinforce one point. It was not first off the line but ended up leading the market place by sheer bulk and muscle. But what of the consequences if IBM had been first in some major development?

We will shortly find out only too easily: the invention of relational database systems is arguably the most significant development this decade and IBM could with considerable justification claim a proprietary right to the concept.

If program overlays are necessary, they should be executed when there is a natural break in the sequence of input.

In summary it is true to say that the difference between mainframes and micros is one of width of technique. One tends to have to do more to achieve the same result, but to have to do it efficiently to avoid using up the capacity of the machine or the patience of the user.

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The future of non-experimental relational database systems thus rests largely in IBM's lap and it is not inappropriate to make some predictions based upon present trends in IBM hardware and software development.

IBM will not produce a Codasyl set-structure database management system.

IBM will introduce a file handling (back end) functional processor within the next eighteen months.

This processor will handle all IBM file structures (possibly emulating a 3390 series disc controller) but will have a native mode for handling VMS files.

This native mode will allow some VMS functions—index searching for example—to be off-loaded from the main processor.

There is a strong similarity with the way 370X TP controller work: VMS resides in the main processor; NCP resides in the 370X and takes on some of the work which an older necessitated method such as BSC performs in the main processor.

The back-end processor will have a large capacity bubble memory cache to reduce the access time for clustered retrievals; this again has a parallel in the dynamic address translation look-aside buffer of the current series of main processors.

Input/output channels will become microcode-driven sub-processors in their own right. They will be controlled in groups of six by a "functional processor" development of the existing 3030-series channel director.

This new intelligence will give channels a feature which has been sorely lacking—two way working—analogue to running a communications link of full-duplex instead of half-duplex.

Let us finally make one prediction to what even the purists' apotropaies: The unit of information flowing about in an SNA communications network is to be the user, a request-response unit (RU).

The unit of information in a relational ("fourth normal form") file is a record. It is thus possible that IBM will define an overall relational database management system and its access language Sequel.

Many SNA functions will be performed in the file processor.

so

and the VMS index-searching mechanism will be extended to support generalised searching on content. The work involved in answering a query such as "RETRIEVE ALL EMPLOYEE NUMBERS WHERE AGE GREATER THAN 60 AND SEX=FEMALE" OR (AGE=65 AND SEX=MALE) AND LONG-SERVICE=YES" will be performed mainly in the file processor by searching the data content of records rather than by searching indexes.

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OP SPOT

OPERATIONS staff are often remarkably loyal to the operating system they have been brought up on.

If you don't believe me, assemble a group of staff with different career backgrounds (in terms of the software they have used) and get them to compare notes. You can be sure that each will promote the merits of his particular system.

Trying to gain a wider knowledge of systems

THERE are two types of OS: multiprogramming with a fixed number of tasks (OS/MFT), and multiprogramming with a variable number of tasks (OS/MVT).

With the former, main storage is divided into fixed partitions (each of which supports one job at a time), while the latter has INITIATORS which allocate main storage (and other system resources) in accordance with each particular job's requirements.

In this discussion I shall refer to OS/MVT.

Let's start on the assumption that the system has already been loaded and trace a single batch job through the system.

Now, at all stages the system will display messages relating to the needs of the job by means of a routing system.

In addition to this, the System

Management File will be used by the system to record data concerning the resources the job uses.

The first step for the operator is to start a READER, a WRITER and an INITIATOR. These are all procedures which live on disc and may be loaded into main storage by means of the START command. Next he must feed the job into the card reader, and after this OS takes control of the job.

Firstly, the READER procedure takes the job and places it on one of the input queues. It informs the master console operator of this by sending him the appropriate message.

Next the INITIATOR allocates the system resources required by the job: the tape and disc drives and main storage, etc. Now, each time a tape or

of this command. For example, if one drive is unable to read a particular tape, SWAP might be used in order to find out if another unit is able to do so. Format:

G 140.141

VARY (V). Devices are placed in an online or offline state (in the former they may be allocated to jobs, or tasks, while in the latter they may not), by means of VARY. Example:

V 022,Class= 123pqr

STOP (P). Often referred to as the PARK command (as in parking a car), this is used to stop procedures. Format:

P OOE

DISPLAY (D). This enables the operator to know the state of many of the system's resources. For example, to find out which tape drives are available for use he might enter the following:

D U,TAPE

MONITOR (MN). Dynamically displaying the system's live tasks and the number of jobs on the queues, are two of the applications for MONITOR. The latter is achieved by specifying;

MN N

SWAP (G). The operator can transfer a tape or disc volume to an alternative device by means

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WRITE TO BOX 1986

By Bernard Allen

HINT OF THE WEEK

A few tips on the maintenance of media

LAST week in Op Spot, Deborah Palmer, an operator at the Worthing site of the Gateway Building Society, suggested the manner in which a small to medium-sized tape library might be organised.

And this week, she puts forward some tips relating to the maintenance of the media with a view to reducing the number of read/write errors that occur.

"The need to clean tapes and drives, regularly, is not stressed enough," says Deborah.

She continues, "The labels used for volume identification sometimes cause problems; as one is removed from a tape it leaves a residue which will even-

tually find its way to the read/write heads of one or more tape drives."

It is better to use small cards and attach them to the reels by means of sticky tape, suggests Deborah.

She also points out that "tape drives should be cleaned at the beginning of each day and immediately before any large job is run."

I might add that front panels of tape drives should be kept shut at all times so as to prevent the accumulation of dust inside the units.

• £1.50 will be paid for any reader's hints published in Op Spot.

Underlapping—carry it out with care

MUCH comment has been generated by an Op Spot hint of several weeks ago (CW, September 14), relating to the alignment of pre-printed stationery.

Writes one operator, "When there is a paper change, place the first form of the new box under the last form of the old one. Your suggestion to overlap the paper would result in two half-completed forms."

I would like to thank this person and plead guilty. I did in fact mean to write "underlap".

Rod Small, chief operator at the Automobile Association's site in Basingstoke, Hants, says that he is aware that I meant underlap and, while he agrees with the tip in principle, stresses that great care must be used.

In relation to print quality he says, "If this method is used, extra attention should be paid to the print of the last page or two of the old boxload of paper."

Concerning the actual alignment of the paper, he continues, "Attention should also be paid to the last page of the old boxload to check the horizontal plane of the lines of print. The reason for this is that the paper has greater play from the time it leaves the bottom tractors and is pulled only by the top ones."

And Burroughs says users can implement BNA capabilities at their own pace and "without affecting the basic structures of the user's existing application programs or data communications protocols and network control programs".

Burroughs systems can already be linked to non-Burroughs systems via the NDL and MCS systems.

As for programming the existing Burroughs policy of keeping user application pro-

grams independent from the operating environment is preserved.

BNA extensions have been added to existing supervisory software to enable existing programs written in Cobol, PL/I, Algol and Fortran to use the full

resources of the network.

Although BNA has been officially announced, the company is still vague about when it will become available, stating merely that this is "expected" to happen in 1979.

ICL adds floppy disc storage to 1500 series

FLOPPY disc storage and desk top packaging for the large-screen model have been announced by ICL for the 1500 series of transaction terminal systems. A new business-oriented Basic compiler has been introduced and, as forecast (CW, September 7), the Cumis delay wheel printer has been added to the range offered with the 1500.

The new 1920-character display desk top version of the 1500 is called the 1505, and effectively replaces the 1502 which offered similar features but had the electronics mounted in a desk pedestal.

Twin integral single-reel magnetic cassette drives are offered as an option on the 1505, and the floppy disc drives come in either a desk top twin drive unit or a desk-mounted four-drive unit. The drives are dual-density CDC

devices also used with the ICL 7500 terminal range.

The 1505 offers 8K or 16K bytes of MOS memory, and joins the 1501, 1501/40 and 1503 as the current models in the line. The 1501/40 adds a single disc controller to the basic small-screen model, while the 1503 takes up to 32K bytes of memory and can support up to four disc drives.

A fully-configured 1505 with 16K bytes of memory, dual tape cartridges, four floppy drives and 100 chip matrix printer costs just under £10,000.

In addition to the Basic compiler and Cobol, introduced earlier this year, software to emulate the ICL 7181 interactive communications protocol for linking to large 2900s is available, and interactive IBM communication facilities will be ready shortly.

Before Singer pulled out of the computer business, it was working on plans to develop the 1500 as a competitor for the IBM System 32. ICL has brought many of those plans to fruition, and has just introduced a complete 1500 package for estate agents called Easy, which includes rent accounting, a property sales system which matches clients to properties, and an optional mailing module.

Installations of 1500s have doubled to over 10,000 since ICL acquired the product two years ago, and it is now a vital item in the company's portfolio. The company expects its business to grow by 30 per cent in 1979.

• Pictured is the 1505, which includes dual cartridge tape drives at the top of the unit.



Networking era arrives for Burroughs users

THE era of high level networking has arrived for Burroughs users. The mainframe company has announced its system software for those who wish to develop networks of interconnecting computers, under the name of Burroughs Network Architecture, BNA.

Burroughs has placed heavy emphasis on flexibility. BNA allows any element in a network to communicate with any other, or to consult any database. Job tasks and files can be transferred from one host to another, and jobs can be shared between different hosts.

The other new control concept, Network Services, controls communications between hosts by means of Burroughs Data Link Control bit-oriented procedures. It also permits Burroughs computers to be interfaced to X25 packet switching services.

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As for programming the existing Burroughs policy of keeping user application programs independent from the operating environment is preserved.

Although BNA has been officially announced, the company is still vague about when it will become available, stating merely that this is "expected" to happen in 1979.

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Day One Thursday, December 7

08.45	Delegate registration
09.30	Opening address
09.45	Use of computers in exploration Kindel P. McNeill, J. Sefel & Associates
10.15	Ottshore structural modelling simplified through interactive graphics Peter Kite, BOC
10.45	Coffee
11.00	Use of computers in production engineering, R. Schofield, BNOC K. S. Doherty, Global Technical Services Ltd.
11.15	Lunch
12.30	Use of computers for drilling Larry Flounry, Drill-Tech Ltd.
14.00	Computers for Planning from exploration to float-out
14.45	Tea
15.00	Computers—future developments in the oil and gas industry Alun Whittaker, Exploration Logging Services Ltd.
16.00	Conference ends

Day Two Friday, December 8

08.45	Delegate registration
09.45	Computers and economics
10.30	Use of computers for stock control and preventative maintenance
11.15	Coffee
11.30	Use of computers for personnel logistics security Roland Bell, Rockall Data Systems Ltd.
12.15	Lunch
14.00	Use of computers in platform design and construction Dr K. A. Pike, Compedit Ltd.
14.45	Use of computers in platform operation and control
15.00	Tea
15.15	Computers—future developments in the oil and gas industry Alun Whittaker, Exploration Logging Services Ltd.
16.00	Conference ends

Approx.

Delegates' fees include full report of the Conference proceedings, morning coffee, lunch and afternoon tea on each day booked. There will be no papers distributed in advance.

To reserve hotel accommodation, please contact Mr Jack Ward, American Express Travel Service, Trafalgar House, 11 Waterloo Place, London SW1Y 4AS. Telephone: 01-930 4411.

***** BOOKING FORM *****

The Use of Computers in the Oil & Gas Industry

Café Royal, London W1, December 7 and 8, 1978

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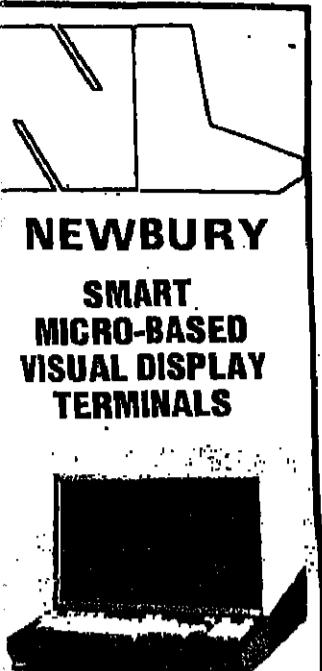
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PEOPLE AND EVENTS

An MD for military micros



Wheeler

A MANAGING director has been appointed at Systems Production Ltd, part of the Systems Design International group. He is Alan Wheeler, who is a director of Systems Design Ltd.

Wheeler has been involved with military aerospace systems for over 20 years and his first contact with computers came via work on Blue Streak and Lineman for Marconi. He was also seconded for a year to the Nudge consortium formed to set up an air defence system, where his function was the procurement of digital systems from the members.

He joined SDL in 1973 as a senior consultant on air traffic control and defence systems and in 1976 was made a director responsible for all project work.

Group chairman Philip Swinstead has been acting as MD of SPL since its formation in 1977. It was formed to provide micro-based products and systems using SDL's experience in the specification and procurement of hardware, particularly for military applications.

There are also plans for SPL to enter the field of the development of

Multiple appointments made at Quadrant Software

THE manager of the Sheffield office of Quadrant Software, Les Abbott, has been appointed to the board. Jeff Spencer, sales executive, has become technical manager of the Sheffield office.

Two sales executives have been appointed at Quadrant Software. They are Peter Smith, previously managing consultant of Quadrant Recruitment's Manchester office, and David Swann, who was a consultant in the company's Sheffield office.

Recently appointed customer engineers with Cara are Bill Fogarty, previously an engineer with the Irish Department of Posts and Telegraphs, and Martin Gleeson, who joins as a trainee.

From CAP Northern, where he was a sales executive, George Gunn joins Quadrant's Manchester office in the same capacity.

John Kelly has become technical resources manager of Computer People Contracts, a VLI Group company. His last job was as DP operations research team leader on a project in Zambia for Roan Consolidated Mines.

Also in the VLI Group are Software Implementation Ltd, where Mike Anderson has become sales and marketing manager, and Computer People Contracts, where Tony Antonides, formerly a sales executive, has become sales manager for the South-East and several national accounts.

COURSES

A COURSE and workshop on stress analysis, entitled 'Neston and the Largest Structural Analysis Problem', will be held at the National Engineering Laboratory in Glasgow on November 13-16. It will be given by M. Gockel of the MacNeal-Schwendler Corp, Los Angeles and is aimed for users of finite element analysis packages. The NEL Unit's 1100 will be used by participants to solve set problems. For further details apply to Conference Section, National Engineering Laboratory, East Kilbride, Glasgow G75 0QO, tel: East Kilbride (0382) 20222, ext. 433.

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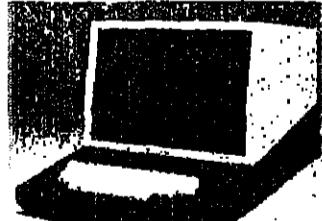
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Edited by Nancy Pocock

OR award to Pactel man

A SENIOR consultant from Pactel, Adrian Williams, has won the Operational Research Society's first Prospect Award.

Williams' work for Pactel on a tanker production scheduling model for a Danish shipyard won him the award, which is to be presented annually to a member of the Society for a project which has helped to promote OR in the eyes of user management.

With £500, the award is sponsored by Prospect OR Recruitment of Hatfield, Herts.

Performance will be on Wednesdays to Saturdays at 1.10 pm and Sundays at 1.00, for two weeks. Pub food will be available.

ICL gives you dreams for lunch

A LUNCHTIME theatre in Fulham is being sponsored by ICL, whose corporate headquarters is just around the corner. Opening at the King's Head, Fulham High Street, on October 28 for a two-week run is a new musical revue called Mid-Day Dreams, a co-production by the Head Theatre Club and Amazon Theatre Co-operative.

Mid-Day Dreams is described as "a light-hearted look at the dreams and fantasies which often overtake our minds during the working day, whether in the office, the street, or at home". It was written by Chris Whittingham and David Seabrook, who also provide the instrumental accompaniment.

Performances will be on Wednesdays to Saturdays at 1.10 pm and Sundays at 1.00, for two weeks. Pub food will be available.

TOM Turp has joined the Logabex OEM division as South of England sales manager for matrix printers and terminals from Trend Communications, where he was an area sales manager.

TOM GARNIER, managing director of the Kalamazoo Group, has been appointed chairman of the recently-formed subsidiary Kalamazoo Finance, and group secretary Geoffrey Brathwaite has been made a director and chief executive of the new company.

DAVID MARWOOD, company secretary of ICL, has been appointed a director of International Computers Ltd, its main operating subsidiary.

There are also plans for SPL to enter the field of the development of

CONFERENCE

A CONFERENCE entitled 'A Practical Approach to Installing Computers for Purchasing and Supply' will take place on November 7 at the Excelsior Hotel, Heathrow Airport, London. It has been organised by the computer specialist

Calls for papers

PAPERS are invited for a conference on recent and possible future developments in the design and performance of RHV switching equipment to be held on November 20-21, 1978. The conference will be organised by the power division of the Institution of Electrical Engineers in association with the Institution of Electronics Engineers and the Institute of Mathematics and its Applications. Syposia should be held before December 1978 by the Organising Committee, IEE Conference Dept, Savoy Place, London WC2R 0BL.

A CALL for papers for the Fourth Conference on Software Engineering has been issued by its sponsors, the IEEE Computer Society and Gesellschaft für

DIARY

OCTOBER 23 Project management of automation systems—improved—Culverton, Institution of Electrical Engineers, Savoy Place, London WC2R 0BL. Tel: 01-580 5111, ext 1474.

OCTOBER 24-25 Software management, conference, American Institute of Aeronautics and Astronautics/Royal Aeronautical Society/Technical Marketing Society of America, Royal Lancaster Hotel, London WC2B 4JG, tel: 01-242 4045.

OCTOBER 24-25 Mini and micro forum. Online.

OCTOBER 25 Interactive engineering design, the Inside story. Dr John Knapper, ICS Newsroom Branch/IMA, YMCA Building, Ellison Place, Newcastle upon Tyne.

OCTOBER 26 Unplugged hardware—the severely disabled. Dr Alan R. Smith, BCS Teesside branch, Teesside Polytechnic, Middlesbrough, TS1 3BX.

OCTOBER 27 The microchip takeover—a new challenge for management. Dr J. H. B. McNeel, Microprocessor Application, BCS, Savoy Place, London WC2R 0BL. Further information from Dr J. H. B. McNeel, BCS, 2417, 1871 ext 280.

OCTOBER 28 Student evening. BCS Edinburgh branch, Mountain Bldg, Heriot Watt University, Edinburgh. Ticket only. Details: Peter Parker, 031-556 8455, ext 113.

OCTOBER 29 Plato, N. Spooner, BCS Teesside branch, Teesside Polytechnic, Middlesbrough, TS1 3BX.

OCTOBER 29-30 Basi, the subtitling of television programmes. L. A. Thomas, BCS Leicester branch, Leicester Polytechnic, LE10 3JL.

OCTOBER 30 Integrated DB/DS. Trevor Sankey, Geoff Baker, BCS Database User Group, New Engineering Block, University College, London WC1E 6BT.

OCTOBER 30-31 Programming Group meeting. IBM Computer Users' Association, Dr Vere Coveney, 2417, 1871 ext 280.

OCTOBER 31 One day seminar 'Getting into computing'—for the distributive trade CDA and NCC, Manchester. Further details, George Kinner, tel: 061-228 6333.

Demonstration by various manufacturers of computing equipment, BCS N. Wilts branch, BCSMS, 2417, 1871 ext 200.

OCTOBER 31-32 Operations group meeting. IBM Computer Users' Association, Newcastle-upon-Tyne.

OCTOBER 27-NOVEMBER 2 Electronics '78—electronics fair and seminar. Association of Electronics Manufacturers in Denmark, Bella Centre, Copenhagen.

OCTOBER 30 Computers in television. Terry Smith, BCS Cheltenham & Gloucester branch, Gloucester, GL1 4JL.

OCTOBER 30-NOVEMBER 1 AGM, CMC Users' Association, CUMAC, Wigston Stagecoach, Leicestershire, LE12 8LZ, Melton Mowbray, LE12 8LZ.

OCTOBER 31 Sensitivity analysis for computer-aided

LEASED LINES

With the excitement of setting up the new offices in St. James's and buying a 3 megabyte 370/168 from an Italian bank, J. R. has gone power crazed. Now he wants to set up a computer dial-up service so that we can have instant access to clients' needs and exchanges. I suggest a blackboard and chalk and a kind of hurt look come over his face skin to that of a religious zealot. I suppose we shall do it soon and will let you all know.

M.R.D. bought and sold some Model 5 IBM tape drives last Thursday and this is developing into a good line for us.

370/148s are a very good buy at the moment and we can offer a selection for you. The base price is 60% of IBM's new price. This means we can lease a 1 megabyte 148 to you for the astonishing low price of £7,895 per month over four years. You can buy, lease or take a conditional sale with or without Government capital allowances. So, if you can't wait for the new "E" series, give us a call.

J. R. has for sale some 3420 Model 8 tape drives and 3830 disk drives for sale. M.R.D. wants to buy 3360 disk drives. Me? Well I just want to sell that 370/168 to pay the rent.

Will write again next month.

M.P.H.

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White House calls for DP shake-up

From Cameron Davis in Washington

"UNLESS something is done soon to improve significantly the way information technology is being used in the federal government, the general wellbeing of the United States will be seriously jeopardised." That was the basic conclusion reached by President Carter's Reorganisation Project on Federal Data Processing. A "discussion draft" of the DP reorganisation team's final summary report, which will be forwarded for President Carter's consideration, was circulated last month among the 10 task forces that contributed to the project. Revisions to the first draft will be made this month and the final report is expected to be completed by October 31.

The first section of the draft document, called "Advocacy for Information Technology," recommends that the Office of Management and Budget should develop, by November 30, a Presidential Reorganisation Plan which would create a special assistant of the President for information and technology policy, plans and programmes; an executive associate director for information resource management policy within OMB; an information resource manager in each department; and a National Council for Information Technology Policy and Programs.

Various members of the reorganisation project have voiced their dissatisfaction with the draft recommendations.

Roxanne Williams, chairwoman of the Interagency Committee/Automatic Data Processing, claims that the first recommendation, at least, will be dropped. "We certainly don't need one more government agency (ITP) telling us how to run our DP operations. All that we do is create more bureaucracy and more work."



PDP-11/34 for Dulwich College

A MAJOR step in an already ambitious programme of computer education has been taken by Dulwich College, South-east London, in acquiring the complete PDP-11/34 system for students' use. Eight terminals, a mixture of DECwriter and VDUS, have been installed, with two disc drives, a line printer, and a magnetic tape unit.

Dulwich has had a computing centre since 1968, up to now using terminals to an outside bureau. Our picture shows two pupils working in the terminal room which adjoins the machine room.

The machine is running under RSTS/E, allowing pupils to program in Fortran, Basic and Assembler. The computer is also being used for a considerable amount of school administration.

School timetable planning software

FURTHER software for school timetable planning is available from Oxford Systems Associates (CW, Feb 9). This is the Oxford Course Planning Aid, which is designed specifically to help with the problem of option grouping. In its standard version it allows an unlimited number of students to select up to seven subjects each from a choice of 54.

OXCPA, as it is called, is written in Basic and will run on a microcomputer with 32K of memory.

The program costs £95 in the standard version.

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DIAL IAL For fuller information on IAL data communications equipment and services and the network of IAL bases throughout the world, telephone 01-574 2411 or write IAL, Aeradio House, Hayes Road, Southall, Middlesex UB2 5NJ. Telex: 24114 Cables: INTAERIO Southall.

Students want research into micro impact

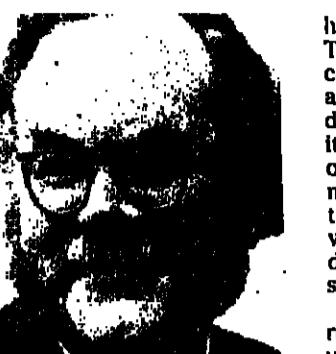
Some of the best activities of the British Computer Society are initiated by the BCS specialist groups. These groups are organising a conference in London from January 4 to 6 called

BCS 79, Living with Computing. In this series of articles, the work of the specialist groups and their BCS 79 plans are described. This week the focus is on word processing and its implications.

WORD processing has been described as the application of electronics to the typing process, by which is meant the complete activity from the capture of text, through its manipulation to its distribution and printing. It thus embraces text preparation on terminals, consisting of keyboards, with or without VDUs and with or without hard copy devices, and its dissemination over telecommunications links or through the mail to other similar devices or to the final recipient in an appropriate number of copies.

This is an area where many changes are taking place as a result of the introduction of modern technology. Replacement of typewriters by word processors extends the capability of typists to handle work, particularly repetitive work and the retyping of drafts. Indeed, estimates for increased productivity range from 25% to 40%. This has clear implications regarding the reorganisation of office work, and may well lead to a significant loss of job opportunities, if not to actual unem-

Word Processing Specialist Group's role



The author, Professor Sandy Douglas.

ployment, where up till now a continuing expansion in employment has taken place over many years.

Moreover, the possibility of linking word processors over telecommunications, and of extending their capacity to

handle files, is considerable. The linking of local systems can be done in such a way as to allow the preparation of a document on one machine and its reproduction subsequently on one or more remote machines, thus passing over the telecommunications link what might otherwise be produced as local hard copy and sent by mail.

Finally, the processes of reproduction in hard copy are undergoing change with the introduction of cheaper and more effective phototypesetting equipment, which is itself computer driven. There is an increasing tendency to carry out printing in-house rather than sending it out to printers, and to integrate this printing into a more general procedure for reproduction of documents using, for example, photo-

composers working off hard copy.

While it is not the primary role of the Group to explore all the social consequences of these significant trends, nevertheless it is impossible to discuss word processing without an awareness of them.

The Group naturally has as its primary interest the exchange of experience regarding hardware and software included in word processors and of know-how with regard to their choice and introduction. However, in the last year we visited not only several manufacturers but also the NPL to discuss the impact of schemes such as SCRAPBOOK and of their fast laser-driven output equipment. It is intended to continue to keep the manufacturers' offerings under review in the coming

79



LETTERS

Leaving it to bosses invites chaos

YOUR correspondent I. Drummond (CW, October 5) asks whether the establishment and maintenance of professional standards in computing should not be left to employers instead of other bodies, because so many of those involved in computing are in employment rather than being self-employed.

I think the place of employment or whether one is self-employed have nothing to do with the matter. The fact that most engineers, for example, are employees does not lessen the need for standardisation and professional bodies in engineering. To leave such functions to thousands of (competing) employers is to invite chaos, and anyway the employers' interests are not always the same, between themselves and vis-a-vis the public.

Where I am sure that Drummond and I agree is that employers have a vital role to play in the establishment of standards and their maintenance thereafter, and that it is in their interests to have staff who are fully trained.

PAUL SAMET
President
British Computer Society

Survey analysis packages

I WOULD like to correct certain information given in the article on Survey Analysis Packages (CW, September 28).

ASCOPE, ICL, Dataskill has no direct connection with this package. Dr B. E. Cooper, the author of ASCOPE, who now works for Dataskill, may be able to answer some questions. We do not know from whom information should now be obtained.

DAS, Information from ICL Dataskill/local ICL office.

PACKAGE-X, Requests for information from UK government funded bodies should be addressed to CSO. Requests from other people should be addressed to ICL, Dataskill.

XDS2/3, Information from ICL, Dataskill/local ICL office.

XDSF, Information from ICL Dataskill/local ICL office.

A. E. THOMAS
Manager, Data Analysis Unit
Advanced Systems Sector
ICL Dataskill Ltd,
Rendall Bridge House,
Reading RG1 8PN

The Editor welcomes letters on subjects published in Computer Weekly, or on original topics. All letters must be accompanied by the writer's name and address, not necessarily for publication. All letters are liable to be cut at the discretion of the Editor, unless correspondents state that their letters may not be cut.

Eighth UK plant

AN eighth UK plant is planned by Burroughs, ultimately offering employment to 200 people. The 100,000 square foot facility is to be built at Livingston New Town in Scotland and will become a centre for research, design and manufacture of high-technology computer products.

Yesterday's branch office



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PENTHOUSE Peta Lorraine Hanson (left) and Lynne Ralph were among the attractions in Luton, last week, when the Fisher-Woods computer shop officially opened its doors for business. The shop, at 110 Leagrave Road, handles Sol, Cromemco and North Star systems, via distributor Comart, together with Apple IIIs from Personal Computers and the other type of PC, from Commodore. Bob Crook and Robin Woods, who run the shop, will also sell the Alpha system imported by AEM Systems of Southport. Fisher-Woods also has people working on an accountancy package that should supersede anything currently available. Initially it is being designed on a Cromemco System 3 or Z2D system with 48K bytes of memory.

Goonhilly to test speech squeezer

A WAY of squeezing a quart into a pint pot is how Cambridge Consultants describes the digital speech interpolation equipment it has developed for the Post Office, and which is now being installed at the Goonhilly ground station for working tests via Intelsat.

Using a complex distributed multicomputer approach based on seven Texas Instruments TMS9900, 16-bit chips, the equipment has been designed to double the capacity of time division multiple access, TDMA, links without adding to the space segment costs.

To achieve this task, the system works dynamically seizing and re-allocating channels during conversational pauses, so halving the number of channels required to handle a given pool of speech signals.

Included in the £200,000 development contract placed by the

Post Office was a requirement to build a speech activity simulator so that the system could be tested.

Based on two Intel SBC 80/10 microcomputer cards, this has to simulate the speech activity of up to 240 terrestrial channels. The simulation is based on stored statistical distributions of various parameters found in a typical conversational pool. To evaluate the interpolation equipment, one or more test channels are monitored continuously while the simulator loads the equipment with dummy traffic.

The basis of the DS1 equipment's operation lies in providing accurately timed bursts of data within the TDMA time frame. The frame itself is 750 microseconds in duration, and consists of bursts of data transmitted to a satellite from all the ground stations within the satellite's area. Each burst is timed to arrive at the satellite at a pre-determined point within the time frame, and consists of data transmitted at a rate of 5125 Mbit/s per second.

This data is made up of a preamble, which gives such information as the transmitting

station's identification code, and up to eight sub-bursts from the DS1 systems attached to the ground station.

The sub-burst contains the 120 satellite channels being transmitted together with an assignment message which, when received at the receiving ground station, gives instructions on the changes in routing of the satellite channels.

Changes in channels are made on the basis of voice activity on the channel, and the level of demand for channel access. When the demand from the 240 terrestrial channels exceeds the capacity of the 120 satellite channels, voice activity is monitored. Unused channels at the time of each sub-burst are then switched to another terrestrial channel. This process is repeated with every sub-burst.

Several other countries are testing similar systems, but the majority of these are based on single minicomputers controlling the whole operation of speech interpolation. By going to a distributed micro approach, Cambridge Consultants feels that the Post Office, though later in the field, may well have got a better deal.

Was the delay in introducing the DME facility for 1980 and System 4 users to migrate relatively painlessly to 2900 a mistake or a deliberate policy?

"I think it was policy and was the right thing to do," says Dr Wilson. "The most important thing with a new range is to get people using it in native mode as quickly as possible. And anyway the microcoding techniques which enabled us to develop DME were not really there much earlier. I think that DME was an opportunity taken at a time when we were in a position to take it."

Dr Wilson

is also convinced that, far from being a mistake, the introduction of New Range was essential for the company.

"The 1980 and System 4 architectures were unchanged since the early 1980s, whereas with 2900, we have a good posture for the 1980s and 1990s. We might have derived some short-term benefit from developing 1980 further, but it would have been limited, and it would not have helped the System 4 user."

From the day he took over as managing director of ICL 11 months ago, Dr Wilson has consistently stressed the importance of services in the continued growth of the company's busi-

"There is no one thing which you can identify in 2000 architecture as being outstandingly now: you can talk about stacks, virtual memories and so forth, but the strength lies in the combination and in the fact that current techniques were designed in-rather than being added as afterthoughts."

Like his predecessor Geoff Cross, Dr Wilson believes firmly that the single-tender policy for computer procurement by the government is vital, not only for ICL but for the whole UK computer industry and indeed the nation as a whole.

"We are also planning to stage high technology seminars and we already have development seminars over two or three days for company directors, which attempt to demonstrate to them how they could use computing more effectively in their business."

"Most of our training is still done in the UK, but we have about 240 lecturers on our staffs of training in 30 countries."

Dr Wilson

has already identified

Continental Europe as a

reorganisation of the industry.

"I never get involved in discussions about bringing companies together," he says firmly. "I think it is very damaging to the companies involved to talk about it, and people who do constantly talk about it are often insecure about their own companies."

The major challenger to any computer manufacturer is, of course, IBM, and companies have tried two ways to emulate IBM in the computer business. One is to copy slavishly every product that IBM introduces in the hope of picking up crumbs from the giant's table. The other is to emulate the general business principles which have been a major factor in IBM's success — a policy particularly emphasised by that phenomenon of the German computer industry, Heinz Nixdorf. Dr Wilson's thinking clearly follows the same lines.

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In the future, the added value

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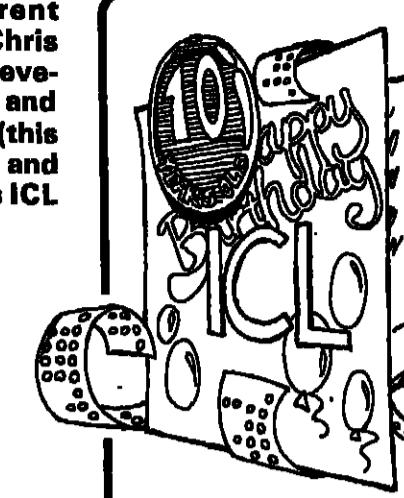
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● Turn to page 17

THE FIRST TEN YEARS

interviews ICL's current managing director, Dr Chris Wilson, about ICL's achievements in its first ten years and his hopes for the future (this page). And on pages 16 and 17, Fred Lamond analyses ICL product strategy.

'No merit in coming second' — Chris Wilson



S. African problem

and do not fear that we will lose business in Nigeria: the Nigerian trade with South Africa themselves."

Turning to the United States, ICL's ambitions there seem to have become more modest over the past year.

"I do not see ICL Inc ever representing more than 2 to 3% of our total business, and I would be quite happy in five years' time to see it as a small, profitable company doing about £30 million a year," says Dr Wilson.

"We found that we were spread too far in the US, and we have done some retrenchment; we are also reviewing our relationship with our dealers."

"We are selling 1800 and System Ten 220, and market the 2803 in a slowly widening area around New York."

"We need a recognised presence in the US to assist our credibility in the rest of the world, and eventually we shall introduce the large 2900s there in a controlled manner. Selling 2900 in partnership with a US company is not now being considered."

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● Turn to page 17

This month, ICL celebrates its tenth birthday, although the history of the company is much older, because most of the pioneers in British commercial computing, like British Tabulating Machine, Powers-Samas, Leo, Ferranti,

in Computer Weekly's ICL birthday feature, Tim Palmer

Elliott Automation and Marconi had contributed to forming ICT and English Electric Computers, the companies which merged in 1968 to form ICL.

in Computer Weekly's ICL birthday feature, Tim Palmer

THERE have been many milestones for ICL in the last ten years, such as the Singer acquisition in 1976, the arrival of Geoff Cross in 1972, the launch of New Range in 1974 and the 2803 in 1973. In the view of the current ICL managing director Dr Christopher Wilson, which of these was the most significant in ICL's 10-year history?

Dr Wilson passes over all the block-busting events and instead goes for something more subtle.

"The most significant change came when the company started to believe in itself, and I think that happened about six years ago. Once people start to believe in themselves, it pervades the whole company. People started going into contract negotiations expecting to win. There is no merit in coming second. You have to win in this game; to be placed second where you used to come sixth is no good at all."

Dr Wilson will not be drawn on the reverse side of the coin.

"It is up to the outside world to comment on our mistakes. Of course we have made mistakes, but the important thing is to recognise them and take steps to rectify them quickly."

"Overall, Datasil is about doubling its turnover every two years, and the opportunities for setting up a Datasil operation in each country are good. I believe it is quite possible to build up a software, systems, applications and perhaps turnkey contracts company from scratch, but bureaux are another matter.

"I think it would be difficult now to start bureaux from nothing, and acquisitions lead to traumas. In other parts of the world — Australia, New Zealand, Singapore, South Africa, Nigeria, Zambia — we have always operated under the laws of the countries where we do business, and under the law as laid down by the UK government. But bureaux are another matter.

"We have had a request from the South African government for licences to manufacture some of our products there, and we are considering the pros and cons of a licensing agreement with them."

"Our business is running at close to £50 million annually there. This makes ICL subsidiary a little bigger than ICL France, but not much. I am not aware of any African country threatening a boycott of our products because of our South African business.

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"It is estimated that, by 1981, the total European expenditure on all aspects of data processing will be £15,000 million, and the services element of that is enormous. The opportunity is there, and we can increase our share by development of our own staff and by Datasil-type operations."

"I think it would be difficult now to start bureaux from nothing, and acquisitions lead to traumas. In other parts of the world — Australia, New Zealand, Singapore, South Africa, Nigeria, Zambia — we have always operated under the laws of the countries where we do business, and under the law as laid down by the UK government. But bureaux are another matter.

"Once we have trained them, we endeavour to place them, and I'm told that we have had 100% success in finding jobs for the people we have trained under the scheme."

"We are also planning to stage high technology seminars and we already have development seminars over two or three days for company directors, which attempt to demonstrate to them how they could use computing more effectively in their business."

"Most of our training is still done in the UK, but we have about 240 lecturers on our staffs of training in 30 countries."

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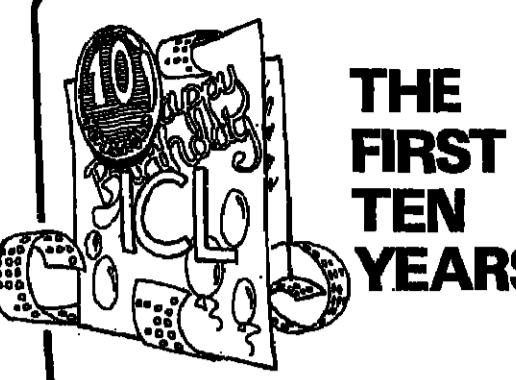
Off-the-shelf DG stockist

THE availability of 16-bit microcomputers from the traditional minimeakers is making new marketing methods essential, and Data General is pioneering the use of stockists who can offer off-the-shelf delivery of items like the MicroNova.

Data General appointed Schweber as its US distributor last year, and plans to appoint further stockists for MicroNova products throughout Europe.

Celdia will offer fast delivery and immediate delivery, and we need to be more outward looking. We see a lot of people from both major parties from time to time, and as the computer industry is increasingly important, people's everyday lives become more important," says Dr Wilson.

Although office automation will become a more important part of ICL's business in the future, Dr Wilson does not see the company getting into the computer market. "We have the largest 10 Megabyte disc drive,"



Bold gamble to win the 'information market' of the 80s

AT the time of the 1968 merger, the announced models of the 1900 Series and of System 4 paralleled each other all the way from the price-performance level of the IBM 360/20 to that of the 360/65. See Table 1.

The customer bases of the two series were much more complementary. The 1900 Series dominated the British and Commonwealth markets for small to medium sized systems, but the largest systems installed in any number at that time were the 1904E and 1905E, as well as the earlier 1906 and 1907 of roughly equivalent power. Deliveries of 1904F and 1905F systems were only just beginning, and those of the equally powered but more advanced 1904A were not due to begin until 1970.

As for the radically re-engineered 1906A, announced in September 1967, it was at that time little more than a paper tiger which had collected no more than a single letter of interest.

English Electric Computers customer base, on the other hand, lay mainly among a small number of large users, notably the Post Office. Deliveries of 4/70s had begun to replace earlier KDF 9 and LEO 326 systems, and orders for this top-of-the-range system were quite substantial. It was at entry level that the 4/30, whose design had been subcontracted to Marconi as part of an internal English Electric political battle, had been somewhat of a disaster story.

Since the Ministry of Technology's main reason for pushing the two surviving British mainframe manufacturers into a merger had been to eliminate wasteful duplication of development effort on identically powered products, ICL could thus have undertaken some immediate drastic pruning of its product line without upsetting any customers.

At the lower end, it could and did pension off the 4/30 as fast as outstanding contractual commitments to Marconi permitted, and converted the small number of 4/30 users to 4/50 systems by 1971. This left the whole small system field clear for the successful 1900 Series.

At the top end, no one outside West Gorton would have missed the 1906A if ICL had then quietly withdrawn it. The announced power of the 1904A gave ample top cover to the existing installed 1900 user base, and it seemed likely that processor design could in time be stretched further with later and faster components, as indeed it was in the 1904S announced in 1971.

Beyond that, the obvious growth path for medium size 1900 users and the more substantial number of 4/70 users lay to a large 32-bit word processor that would have implemented a superset of both the 1900 and System 4 order code.

Such a joint superset processor would not have been very difficult to design. For apart from their dissimilar data structures, 1900 and System 4 processor architectures were really quite close (Table 2). Both used a "one-and-a-half address" type of processor logic, in which one operand is fetched from an indexed main memory address, while the other is fetched from, and the result stored in, one of a small number of general purpose registers, some of which can also be used as index registers.

Within this common design philosophy, System 4 had the more complex architecture of

the two series, offering notably a larger number of registers of greater width, and a larger range of arithmetic operand types.

It would thus have been far easier to emulate the 1900 machine code on a System 4 processor than the other way around. The only instructions that would have to be added to System 4 360-compatible machine code were the 1900 indirect addressing facilities, in

the IBM 360, it was essential that ICL offer at least one equally homogenous computer family from bottom to top.

These 1968 remarks acquire their full weight when read in the context of ICL's current product range 10 years later (Table 3). Leaving aside the System 10 and 1500 series acquired from Singer only two years ago, ICL's successor 2900 series offers an even greater diversity

	IBM	ICL
System 360	System 4	1900 Series
Model 85	—	—
75	—	—
65, 67*	—	1906A
—	470, 475*	—
50	—	1904A/F, 1905F
—	450	1904E, 1905E
40	—	1903A
30	—	1902A
25	—	—
20	—	1901A

Table 1: IBM and ICL product lines in 1968 in rough order of processing power. *Time sharing model with virtual addressing facilities.

which the IBM 360 and System 4 were notoriously deficient.

It was thus with considerable surprise that I learned at a pre-merger briefing for English Electric Computers staff that, far from quietly withdrawing the 1900s and basing its future large machine development programme on a System 4/1900 superset, ICL proposed to add an even more powerful 1908A to the top of the 1900 series to encourage 1906A sales.

The Ministry of Technology seems to have been equally taken aback by this unnecessary perpetuation of two rival big machine designs. At the product briefing that they received, one of their senior officials is said to have remarked: "Now you have made our task more difficult".

The 1908A was duly announced at IFIP in Edinburgh, in August 1968, but elicited not the slightest government interest or orders. A year later it was withdrawn, after ICL had initially decided on Project 51, that was to become the 2900 series.

The 1908A was not withdrawn, however, but was forced on British universities from 1971 to 1974. They received it with all the enthusiasm normally reserved for a dose of castor oil. The justification for this was that 1908A architecture gave a better single batch program throughput than 4/70 architecture using identical components.

The 4/70, like the whole of the System 4 range, had much better interrupt handling facilities, and many universities might well have preferred these for their internal timesharing networks. But those that had not been allocated their funds in time to place System 4 orders before August 1968, were never given the choice.

Under ICL's aegis, System 4 was largely limited to existing users, to the byte-oriented Eastern European market, and to special real time projects such as the London Airport Cargo Entry System, LACES.

On questioning this decision with ICL at the time, I was told that withdrawing the 1906A would have greatly impaired the whole 1900 market credibility at a time when ICL depended on it for three-quarters of its revenue. To compete successfully against

the 2900 series is in fact a wholly new general purpose computer series, that is not upward compatible other than via conversion aids with either of ICL's two computer families of 1968.

ICL is the only major mainframe manufacturer to have introduced such a new series in the last 10 years, and the only one to have imposed such an upheaval on the source program and data file libraries of its larg-

est and cheapest native mode 2930 and 2940 systems to market running under a more compressed VME/K. Nor should it attempt to convert 2950 DME users to VME/K and the 2900 native mode when they have reached the limits of DME.

The restrictions this caused on both System 4 and large 1900 users' ability to expand caused them to put increasing pressure on ICL to announce its new series.

When ICL did launch the 2970 and 2980 in November 1974, it was much too early in the VME/B development cycle. Their early users were soon vociferous about the new system's low throughput and MTBF. According to one 2970 user, it is only now, four years after its launch, that VME/B allows him to get the same job throughput on his 2970 as he was able to get on his 1904S using George 3. This has given the 2900 series a bad name in the marketplace, which will take a long time to live down.

ICL seems also to have waited much too long in the 2900 series development cycle to give serious thought to ways of bridging 1900 and System 4 users. It was a bold and imaginative leap which one hesitates to condemn. IBM was beginning at that time the development of the FS series and the Q operating system with much the same aims in mind, if it had succeeded in bringing these to market in 1976-1977 as planned, ICL could only have survived on the mainframe market by offering its users an equally imaginative systems design.

Both IBM and ICL seem to have underestimated the throughput bottleneck caused by attempting to implement so many different functions on a centralised mainframe operating system, as well as the time required to implement such an operating system efficiently.

But when IBM came up against these obstacles in 1974, it had enough contingency plans in its drawers to be able to cancel FS and Q and write off the millions spent on them to experience.

ICL, on the other hand, seems unwilling to have committed its main R&D resources much too soon to the new series, and allowed both System 4 and 1900 Series hardware to wither on the vine from 1972 onwards. Apart from semiconductor memories introduced between 1972 and 1974, the last 4/72, built in 1975, and the last 1902Ts and 1903Ts, built in 1977, were little different

	1900 and 2900 DME	System 4	2900 Native Mode
Basic addressable unit (bit)	24	8	8
Arith & logical operand length (bits)	24	16 or 32	8, 16, 32, 64, 128
Fixed point binary (not sign)	48	32 or 64	32, 64 or 128
Floating point binary (not sign)	—	1-31	1-31
Decimal (digits)	—	—	—
Number of addressable CPU registers	8	16	5
Number useable as:	8	16	1
Accumulator	8	15	1
Index Registers	3	—	—
Register length (bit)	24 n	32 n	128
Accumulator	16 or 22	24	32
Index	—	—	—
Instruction length (bits):	24	16	—
Register-and-register	—	—	16
Pushdown stack-and-accumulator	—	—	32
Indexed store-and-accumulator	—	—	—
Indexed store-and-register	24	32	—
Indexed store-and-indexed store	—	48	—
Addressing range:	4K words	4K bytes	256K bytes*
Direct operand	32K, 256K or 4M words	16M bytes	64K or 4,000 Mbytes
Indirect operand	32K, 256K words	—	4,000 Mbytes
Direct branch	32K words	16M bytes	64K or 4,000 Mbytes
Indexed branch	—	—	64K or 4,000 Mbytes
Indirect branch	4M words	—	64K or 4,000 Mbytes

Number of addressable GP registers	8	Maximum capacity of variable length pushdown stack allocated to each program segment	256K bytes*
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Table 2: The general purpose architecture of ICL machines. Notes: *Number of addressable GP registers. Maximum capacity of variable length pushdown stack allocated to each program segment.

When ICL and English Electric announced their intention to merge their data processing activities in April, 1968, they undertook to continue to develop both the 1900 Series and System 4 to meet the needs of their respective customers until such time as these two ranges could be superseded by a common successor range.

The unstated but generally understood meaning of that promise was that the future common successor range would offer both System 4 and 1900 users a smoother upgrading path than a forced conversion from System 4 to 1900 standards or vice-versa would have done.

In this 10th anniversary feature Fred Lamond examines how far ICL has kept this promise to its users, and how content these users have been with the new 2900 series.

manufacturers' expense, however, if these are equally unwise and unlock their customer base by forcing their users to convert their source programs in order to grow. Nothing is less probable.

Honeywell has already demonstrated on its Series 60 how many different processor hardware architectures can be accommodated under a common operating system with upward compatible JCL. Now IBM is planning to use OS/MVS as the cloak under which to go with the 2900 and 1100, and as CII-Honeywell Bull intends to do with its Series 60 Level 64 side by side with the HIS-developed Level 66.

This means among other things raising the current 256K 24-bit word main memory limit on 2950 and 2960 systems running under DME 1900. It is a limit in no way imposed by 1900 processor architecture (whose 22-bit address mode allows up to 4M words to be addressed indirectly and in indexed mode) but solely by the ERM executive from which Exec 2, Exec 3 and DME 3 have been developed.

It has not been noticed by small business and distributed processing users so far, but will become increasingly illogical as main memory becomes cheaper and memory sizes of two or even four Mbytes become more common on rival systems such as the Digital Equipment TRAX.

It is doubtful, however, whether internal ICL product planners will allow this to happen, unless it is decided to follow IBM's example and split the company into two separate components, one for small and one for large systems. The 2903/2904 range and all the ex-Singer products would become the province of small systems company comparable to IBM's General Business Group.

On present showing this would be a highly profitable dynamic and expanding company on world markets needing no government support whatsoever, provided it was free to plough back those profits that it does not distribute to shareholders into its own lines. The future competitiveness on world markets of the smaller systems should not be weakened by a continuing drain of the R&D funds that they have earned, to develop a large general purpose computer series with much less certain future outside a British government protected market.

	General Business Group	Systems Products Group	IBM		ICL	
			2900	1900 DME	System Ten	1500
Parallel processing super-computers	—	—	2970+DAP	—	—	—
Large and very large serial processing systems in the ATLAS-Plus category	—	Model 3033	3032	2972	—	—
Medium-sized models	—	3031	3030	2980	2980 DME	—
Multi-station transaction processing systems for distributed processing and small businesses	System 3/15	370/148	125	—	—	—
Single-station systems	System 34	—	—	—	2903/25	—
Desktop system	5110	—	—	—	—	1500
Languages: Cobol	—	3/128, 3/15	Yes	Yes	Yes	Yes
RPG II	—	Yes	Yes	Yes	Yes	—
Fortran	—	Yes	Yes	Yes	Yes	Yes
Basic	Yes	—	Yes	Yes	Yes	—
APL	Yes	—	Yes	—		

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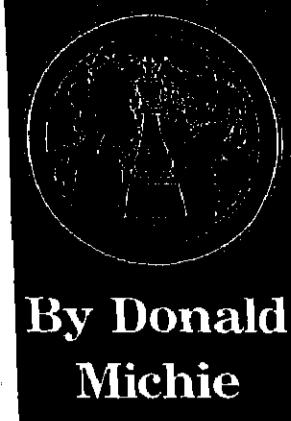
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CHESSLAB

A masterly game and a rewarding challenge

By Donald Michie

IN the razzmatazz of world championship computer chess we have been hypnotised into overlooking some very remarkable home produce. The first seeds of the British program Master were sown by Alex Bell.

Tended and trained by John Birmingham of AERE, and Peter Kent of the Rutherford Laboratory, Master has reached a point of maturity at which it probably has more built-in chess knowledge than any program in the world.

Why then did it not scoop the world pool at Toronto last summer? Remember that it suffered a 2:1 disadvantage compared with Moscow's Kalsaa because of the communication delays imposed on remote operation by the tournament rules. As for Chess 4.6 we can throw in another factor of 5 at least, corresponding to the hardware advantage of a CDC Cyber 176 over an IBM 370/168.

Since then Master's education has come on space, including little things like recognising immediate mates "at a glance". Instead of flogging the legal move generator through all possible variations and replies.

Most convincing of all Master's recent coup in playing a human Expert under conditions amounting in effect to lightning chess from the machine's side, yet allowing the human the normal time for making his moves. To have achieved a draw under these conditions, which

limited Master to a fixed look-ahead depth of five ply, could only have been done by marshalling very considerable reserves of chess knowledge, for at times during the game the human was plainly looking further ahead than the machine. Nick Jackson is known as a strong tactician and is graded about BCF 2100. Here is the game, with commentary by US National Master Danny Kopac:

WHITE BLACK

Master Nick Jackson

1. Nf3 d5

2. c4 dc

This is generally scorned as ceding the centre, but will be interesting to see how White will recover the pawn. Computer programs are notorious for bringing out their Queen too early, and perhaps Jackson thinks he might get an early initiative by drawing out and attacking the White Queen after 3.Qa4Ch, though this is quite playable.

3. Nc3 a6

4. Nxc4 b5

White's grip on e5 is challenged since 5.N/c-e5, f6 6.Nd3, e5 is awkward for White.

5. Nc3 Bb7

6. g3 g6

This is all in Master's book repertoire.

7. Bg2 Bg7

8. d4 Nf6

9. 0-0 0-0
10. Nc2

The Knight on e3 is a funny piece. While being well-placed itself, it obstructs the QB and the KP. The move played admits its awkwardness, and Black is already better thanks to his control of d5 and e4.

10. ... Nf2-d7

Master keeps expecting ... e6, but this is an unnecessary weakening of the dark squares.

11. a4 e5

12. Bc3 Nd5

Black is even contesting White's control of d4. Pointless and weak. Bg3 is better.

13. Ng3

14. fxe Nxe3

15. Kxg2 e5

16. Nc4 cd

White had a horrible pawn structure and position. The move played is OK, but Qb8 is more poignant.

17. ed ed

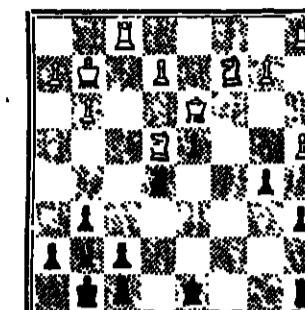
18. Qd3

If 18.Nxd4, Nb6 and White's position is very loose. Master expected this move, though it is not best. Better is 18... Qb6, i.e. 18.e3, f5 20.Qb3Ch, Kh8 21.Ng5, Qb7Ch 22.Kg1, Nc5 etc. Also good is 18... Nc5! 19.Nxc5, Qd5Ch etc. (Qc7 or Qe7).

19. Rb4 Rb7

20. Nxd4 Nc4

White: Master



33. Rb3 b4

34. Nxb6ch Kg7

35. Nf4 Re7

36. h4 Kh6

37. Nd5?

White forces things too soon.

37. ... Rxe2ch

38. Kf3 Rd2

39. Nxc3 Rd3ch

40. Ke2 bxc3

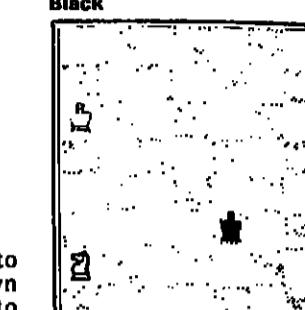
41. Rb6ch Kg7

42. Rh7ch Kf6

43. Rh8ch Kg7

Shamkovitch, who recently visited this country. He has been tormenting his colleagues with the following study:

Black



White

Figure 1: Position after 18... Nf2-d7

Black: Nick Jackson

Figure 2: White to move and draw.

White

Figure 3: White to move and draw.

White

Figure 4: White to move and draw.

White

Figure 5: White to move and draw.

White

Figure 6: White to move and draw.

White

Figure 7: White to move and draw.

White

Figure 8: White to move and draw.

White

Figure 9: White to move and draw.

White

Figure 10: White to move and draw.

White

Figure 11: White to move and draw.

White

Figure 12: White to move and draw.

White

Figure 13: White to move and draw.

White

Figure 14: White to move and draw.

White

Figure 15: White to move and draw.

White

Figure 16: White to move and draw.

White

Figure 17: White to move and draw.

White

Figure 18: White to move and draw.

White

Figure 19: White to move and draw.

White

Figure 20: White to move and draw.

White

Figure 21: White to move and draw.

White

Figure 22: White to move and draw.

White

Figure 23: White to move and draw.

White

Figure 24: White to move and draw.

White

Figure 25: White to move and draw.

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Figure 26: White to move and draw.

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Figure 27: White to move and draw.

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Figure 28: White to move and draw.

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Figure 29: White to move and draw.

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Figure 30: White to move and draw.

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Figure 31: White to move and draw.

White

Figure 32: White to move and draw.

White

Figure 33: White to move and draw.

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Figure 34: White to move and draw.

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Figure 35: White to move and draw.

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Figure 36: White to move and draw.

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Figure 37: White to move and draw.

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Figure 38: White to move and draw.

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Figure 39: White to move and draw.

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Figure 40: White to move and draw.

White

Figure 41: White to move and draw.

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Figure 42: White to move and draw.

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Figure 43: White to move and draw.

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Figure 44: White to move and draw.

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Figure 45: White to move and draw.

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Figure 46: White to move and draw.

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Figure 47: White to move and draw.

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Figure 48: White to move and draw.

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Figure 49: White to move and draw.

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Figure 50: White to move and draw.

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Figure 51: White to move and draw.

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Figure 52: White to move and draw.

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Figure 53: White to move and draw.

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Figure 54: White to move and draw.

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Figure 55: White to move and draw.

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Figure 56: White to move and draw.

White

Figure 57: White to move and draw.

White

Figure 58: White to move and draw.

White

Figure 59: White to move and draw.

How to create more jobs without inflation

By Geoffrey Beacon

THE desire to increase employment without inflation is motivated by the belief that increased leisure cannot be the complete solution to the unemployment problem which is being brought about by the combination of the limits to growth and improvements in labour productivity.

There are two main reasons for this belief. The first is that we still live in a work-oriented society. For the majority, achievement derives substantially from employment. The second reason is that leisure should not be forced on people, either by unemployment or short-time working, who could enjoy shorter periods of leisure a great deal more with the extra income that comes through employment.

In the UK approximately 80% of the cost in producing the gross domestic product is accounted for by wages and salaries, including income from self-employment, which in turn creates 80% of the national income.

As a first approximation, but quite a good one, we can ignore other forms of income such as rents, profits and transfer payments, and divide the working population of approximately 25 million into five groups of 5 million each with earnings of £40, £60, £80, £100 and £120 per week. (In fact the middle three-fifths of the working population earn slightly less and the top fifth slightly more.)

Although such large differences in income are deplorable, it is an unfortunate fact that unemployment exists mostly among the lower paid. This indicates that the wages of the group as a whole are higher than that necessary for full employment.

A rough estimate of current unemployment for each group is taken in Table 1. The reduced

percentages in the last column have 1.5% subtracted to account for that level of unemployment that is thought to be the irreducible minimum.

Sometimes right-wing economists will say that unemployment is caused by monopolistic factors in the labour market. They are clearly referring to those factors which keep the wages of the less well paid above the values necessary for full employment. Two examples of these monopolistic factors are unemployment benefit and the bargaining power of trade unions.

One advantage of labour subsidies is that there can be an increase in employment for the less well paid without a fall in their income. In our simplification of the economy, for this to be true, these labour subsidies must be paid for by taxes which fall largely on the more affluent.

For the purposes of the calculation in this article the tax considered for raising the revenue will be VAT and the total labour subsidy paid will be set equal to the revenue raised.

VAT raises tax on goods and services proportional to their total cost. This in turn can be considered a tax on the factors used in producing the goods or services.

As an example for our simplified economy, Table 2 shows the first effect of raising an extra VAT just over 10% on all goods and services and using the money raised to subsidise labour on a per worker per week basis.

In any case this decrease in demand is more likely to manifest itself as a downward pressure on the wages of better paid rather than unemployment, because for them the "monopolistic effect" of unemployment benefit is less. That is: they lose much more than the less well paid by being unemployed.

The extent to which a change in the cost of labour changes the demand for labour is described by the elasticity of demand for labour. At this stage of the argument its value is not a crucial factor because if the elasticity is low the desired level of employment can be created by choosing appropriately high levels of VAT and labour subsidies.

Since the elasticity of demand

Table 4. The estimated effects of a blanket labour subsidy paid from VAT which creates 10% more jobs among the £40 per week group using a labour only model of the economy.

Elasticity of demand = 0.2 (VAT = 64.4%, labour subsidy = £44.8 per week, production rises 1.1% in real terms).

Wage group	Extra jobs %	Wage change £	% Standard of living change
40	+10	0	+2
60	+4.7	0	+2
80	+1.8	0	+2
100	0	-0.02	+2
120	0	-1.18	+1

Elasticity of demand = 0.5 (VAT = 19.7, labour subsidy = £16.5 per week, production rises 1.6% in real terms).

Wage group	Extra jobs %	Wage change £	% Standard of living change
40	+10	0	+18
60	+2.3	0	+18
80	0	-6.69	+8
100	0	-19.58	-5
120	0	-32.47	-14

Elasticity of demand = 1.0 (VAT = 7.4%, labour subsidy = £7.4 per week, production rises 2.1% in real terms).

Wage group	Extra jobs %	Wage change £	% Standard of living change
40	+10	0	+6
60	+3.8	0	+4
80	+0.5	0	+4
100	0	-3.14	+1
120	0	-7.08	-2

Elasticity of demand = 0.2 (VAT rate = 46.2%, labour subsidy = £39.5 per week). Change in capital income = -8%. Production rises 1.7% in real terms.

Wage group	Extra jobs %	Wage change £	% Standard of living change
40	+10	0	+6
60	+3.8	0	+4
80	+0.5	0	+4
100	0	-3.14	+1
120	0	-7.08	-2

Elasticity of demand = 0.8 (VAT rate = 16.7%, labour subsidy = £16.0 per week). Change in capital income = -8%. Production rises 1.7% in real terms.

Wage group	Extra jobs %	Wage change £	% Standard of living change
40	+10	0	+6
60	+3.8	0	+4
80	+0.5	0	+4
100	0	-3.14	+1
120	0	-7.08	-2

Elasticity of demand = 1.0 (VAT rate = 4%, labour subsidy = £8.34 per week). Change in capital income = -5%. Production rises 2.7% in real terms.

Wage group	Extra jobs %	Wage change £	% Standard of living change
40	+10	0	+3
60	+3.8	0	+3
80	+0.7	0	+3
100	0	-8.76	+0.5
120	0	-16.03	-7

Elasticity of demand = 1.0 (VAT rate = 4%, labour subsidy = £8.34 per week). Change in capital income = -5%. Production rises 2.7% in real terms.

Wage group	Extra jobs %	Wage change £	% Standard of living change
40	+10	0	+3
60	+3.8	0	+3
80	+0.7	0	+3
100	0	-8.76	+0.5
120	0	-16.03	-7

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Wage group	Extra jobs %	Wage change £	% Standard of living change
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60	+3.8	0	+3
80	+0.7	0	+3
100	0	-8.76	+0.5
120	0	-16.03	-7

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80	+0.7	0	+3
100	0	-8.76	+0.5
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Wage group	Extra jobs %	Wage change £	% Standard of living change
40	+10	0	+3
60	+3.8	0	+3
80	+0.7	0	+3
100	0	-8.76	+0.5
120	0	-16.03	-7

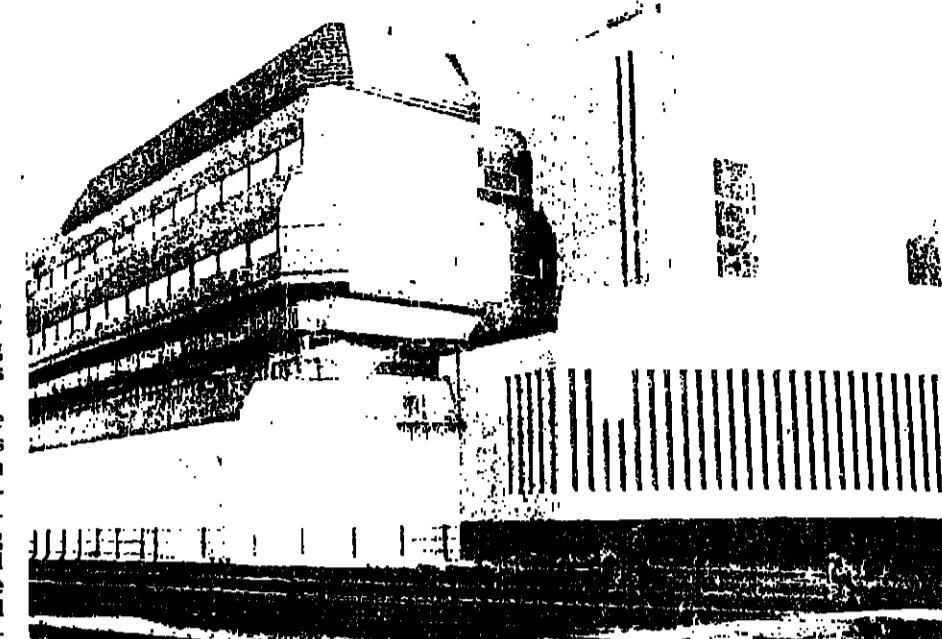
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Wage group	Extra jobs %	Wage change £	% Standard of living change
40	+10	0	+3
60	+3.8	0	+3

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Lloyds Bank new centre, across the Thames from the City, where most of the bank's computer power is located.

THE banking and insurance industries are dominated by a number of very big companies that prefer to acquire their computer staff through internal training schemes rather than hiring experienced DP professionals.

In addition, the security of employment offered by banks and insurance companies and the collection of perks that often go with the job mean that their staff turnover is low compared with other sectors of commerce and industry.

But there undoubtedly are openings for the right sort of experienced systems, programming and operations people in banking and insurance, especially if they satisfy a particular need.

For example, one major bank actively seeking experienced personnel at the moment is the Midland, which is prepared to pay juniors of 18/19 years old between £3,500 and £4,500 a year to work as operators at its computer output microfilm bureau in London, provided they have at least six months' experience working with some kind of computer equipment, not necessarily COM.

The Midland is also looking for experienced systems analysts to be based at Sheffield where most of its systems and programming staff are located those days.

A lot of the 250 staff there moved up to Sheffield from London and the Midland says that the vast majority of them were prepared to make the move because of the financial incentives they were offered.

Most of them would not consider moving back to London, according to the Midland, now that they have experienced the advantages of provincial life, like being able to drive to work instead of commuting up to the City or crowded trains.

The Midland likes the Sheffield area so much that it is now moving the head office and DP centre of Midland Bank International up to nearby Barnsley from Gracechurch Street in the City. The operation will be housed at an impressive new centre that should be completed by 1980 and will employ about 300 staff, many of them recruited locally.

Barclays is another major bank that prefers provincial life. Most of its systems and programming staff have

been based at Knutsford in leafy Cheshire for the last two years. The bank's two main London computer centres at Harlesden and Tottenham Court Road will be relocated to a new site at Gloucester by the middle of next year.

Some of operations staff from the two London centres are not keen about making the move and a number have left the bank already, for that reason, so Barclays is now recruiting trainee operators in the Gloucester area.

Lloyds Bank is taking the opposite approach to Barclays and the Midland by concentrating most of its computer power in central London at Bankside, just over the Thames from St Paul's Cathedral.

Another difference between Lloyds and Barclays is that the former maintains salary scales for its DP staff that are related to the scales for the rest of its workforce, while at Barclays DP staff not only have their own separate salary scales but programmers and analysts have a scale different from operators.

However, the market value of programmers and analysts has persuaded Lloyds to pay them what is called a "technical allo-

according to the company, that their salaries are in the upper quartile of the current market rates.

The Prudential points out that it does not lose more than 10% of its DP staff in any one year and that the percentage was considerably lower than 10% in 1978.

At the same time the company does not take on many experienced staff from outside because it finds that they tend to want something like £1,000 more than they are being paid in their existing job to do the same sort of work.

The Prudential prefers to recruit and train its own staff from "A" level school leavers and university

graduates, as does Royal Insurance, whose DP staff are nearly all located in Liverpool. The Royal operates an IBM 3033 there which forms the centre of a terminal network providing online claims processing facilities for its 200 branches.

The attitude of the National Union of Bank Employees towards remuneration in the industry is one of extreme discontent with the way that the government's pay policy forces banks and big companies, to toe the line while a lot of smaller employers can get away with paying their DP staff more than the agreed limit.

According to NUBE, programming staff are especially annoyed if their bank is forced to employ a contract programmer for a fee that is far higher than the salaries paid to full-time personnel.

The banks have a particular problem at the moment because they award across-the-board pay rises in July each year — the back end of the existing government pay cycle which runs from August to August — so their employees have to wait 11 months before they can catch up with whatever percentage rise has been agreed for that cycle.

According to NUBE, programming staff are especially annoyed if their bank is forced to employ a contract programmer for a fee that is far higher than the salaries paid to full-time personnel.

The Prudential adds that the fall-off in its requirement for operators is now so substantial that any new operators that still need to be recruited must pass a programming aptitude test.

The Prudential maintains separate salary scales for its DP staff to make sure,

that their salaries are in the upper quartile of the current market rates.

According to NUBE, programming staff are especially annoyed if their bank is forced to employ a contract programmer for a fee that is far higher than the salaries paid to full-time personnel.

BANKING AND INSURANCE OPPORTUNITIES

ANALYST PROGRAMMER—CITY TO £8,500 + SUB MORTGAGE

Are you DYNAMIC, SMART, INTELLIGENT? If so, we have the perfect job for you. The responsibility you can handle in this fast growing, modern department, promoted to D.P.M. within short time is very likely. Ideal applicants have good educational background and several years' data processing experience with at least 3 years' BASIC on any mini, systems experience would be a great advantage. This is a very interesting position working closely with the users in a fast moving environment.

* FANTASTIC perks which include subsidised restaurant and full banking facilities, session ticket loan scheme

* Excellent promotional prospects.

Ref. 1883

SYSTEMS ANALYST HANTS. £7,000 +

Newly-created openings exist within expanding D.P. services division of major British insurance group. Retaining IBM 370, they seek Systems Analysts, preferably with a good programming background, able to successfully implement medium to large systems and ability to communicate at all levels — to play an important role in their major systems. Co. offers

- * Good career path.
- * Flexi hours
- * Annual bonus
- * Relocation assistance

Ref. 1870

ANALYST PROGRAMMER CITY TO £6,500

Long established international bank is seeking to recruit experienced COBOL programmer to join team shortly to embark on a complete re-write of its occurring system following a review of its hardware requirement which will lead to the acquisition of a sophisticated mini-computer system. Successful applicant should have 2/3 years' experience of COBOL in financial area, with NEAT 3 in grant ass't. Company offers

- * Mortgage insurance (step on status)
- * Non-contributory pension and life assurance
- * BUPA
- * £10,000 p.w.

Ref. 1878

PROGRAMMER CITY. TO £5,500 + SUB MORTGAGE

Prestigious main bank, based in the City, have a vacancy for a programmer. Retaining IBM hardware and ideal applicants will have at least 2 years' experience of COBOL and probably some ASSET/MILFR. The company offers excellent promotional prospects and will offer training in COBOL. This is a super opportunity for young programmers in your highly reputable organisation and to progress in an excellent career path.

* Working in beautiful offices

* Fabulous perks, which include BONUS and mortgage advance, subsidised restaurant and session ticket loan

* Job security with a pension scheme

Ref. 1878

PROGRAMMER LONDON. TO £6,500 + SUB MORTGAGE

Our client leading banks require programmer with at least 18 months' experience in COBOL, with job sharing and enthusiastic team which retains IBM system 3 hardware. Major enhancements are planned to keep pace with company's rapid growth. Applications will be of financial nature and company offers good promotional prospects.

* Excellent fringe benefits which include banking and credit facilities profit share and non-contributory life assurance and pension scheme and BONUS.

Ref. 1828

JUNIOR SYSTEMS ANALYST LONDON. TO £6,500 + SUB MORTGAGE

Major British insurance company with assets exceeding £40m seeks persons with minimum 12 months' experience of systems which include developing major aspects of systems work, preferably with ICL COBOL. Programming background. Company has well planned future including delivery of ICL 2880 computer next year running under VME/B and covering projected development work.

* Excellent early promotional prospects.

* Full 2800 training.

* FANTASTIC perks which include Flexi Hours, Session ticket loan, free lunch, bonus and annual review.

Ref. 1849

ICL PROGRAMMERS CITY. TO £6,500

An exciting opportunity for ICL COBOL programmers with proven track record to move into a challenging and rewarding work. The company is a prestige British banking organisation currently employing over 1000 people. It will initially be involved in the continuing development of an existing commercial project to be followed by all new development work on 2880. Company offers

* SUBSIDISED MORTGAGE.

* 32½-hour week.

* Non-contributory pension, free BUPA and life assurance.

* Session ticket scheme, 60p LV daily.

Ref. 1886

SYSTEMS ANALYST N. LONDON. TO £8,000

Prestigious organisation providing services to the British banking industry requires Systems Analyst to become involved in the implementation and continuing development of a large on-line communications based system. Ideal candidate should ideally have had a programming background, experience of working in operating system environment with a T.P. and able to play a major role in the design and implementation of an on-line transaction processing system. Experience of ICL hardware a distinct advantage. Company offers

* Mortgage subsidy

* Non-contributory pension

* Personal loan scheme

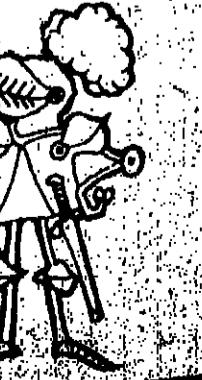
* RELOCATION expenses

Ref. 1888

PLEASE REPLY:

KNIGHT PROGRAMMING SUPPORT LIMITED

27 NOEL STREET, LONDON W1. TELEPHONE: 01-734 0152/8 (24 HOURS).



SPOT
LIGHT
ON

BANKING AND INSURANCE

Systems Analyst

ready for development

The Provident Life Association is a medium sized Life Assurance Company in the City, just opposite Liverpool Street Station. We have subsidiary companies dealing with motor and general insurance, and are a well established and highly respected organisation. Systems Development plays an important role within our company and it is for this section that we are currently looking for an experienced Systems Analyst.

We operate a 1902T installation and the person appointed can expect involvement in a challenging range of development projects.

Applicants will need at least two years' good commercial experience as a Systems Analyst and should be able to demonstrate initiative, imagination and a high degree of professional expertise.

We offer a salary of up to £6,000 with a wide range of generous benefits that include:

- + Mortgage scheme
- + 34-hour flexi-time working week
- + Free lunches or LVs
- + Session ticket loans
- + Christmas bonus
- + Non-contributory pension scheme

For further details, and an application form please contact H. W. Lee, Staff Manager.

PROVIDENT LIFE ASSOCIATION OF LONDON LIMITED

266 Bishopsgate, London EC2M 4QP. 01-247 3200



Opportunities in Banking for experienced

Analysts & Programmers £7,000—£8,500 + home loan scheme

A group of 40 analysts and programmers develop all the Bank's Computer Systems. Current developments of on-line and large scale information systems cover most aspects of the Bank's operations and offer a career challenge for anyone interested in large systems. To meet our long term plans we need to expand our development team by the addition of a small number of staff who can provide experience and demonstrate a record of effectiveness.

The main equipment comprises a 168AP and 3031 supporting MVS, VTAM, TCAM and TSO with a country-wide TP network of over 400 terminals. A second network supports 140 VDUs, printers and SWIFT. New terminals have been ordered to replace the first network. A 3860 and COM have recently been installed. PL/I and BAL are the main languages.

If you are aged 27 to 32 with a good degree or equivalent professional qualification, at least 6 years' project experience and would like to join us in offices adjacent to London Bridge Station please telephone Jean Brown on 01-407 3121 ext. 203/204 for an application form or write to B. H. Ballis, Head of Computer Development, Williams & Glyn's Bank, 25 London Bridge Street, London SE1 9SX.

WILLIAMS & GLYN'S BANK



Bank of New South Wales

The following computer personnel are required for our IBM 370/118 installed in our office at 8 Backville Street, London, W1.

The configuration handles a number of financial applications for our London operations including an on-line system for foreign exchange.

SENIOR PROGRAMMER

Salary circa £6,000

A Senior Programmer is required with experience of IBM COBOL to be responsible for a small group of programmers.

PROGRAMMER/ANALYST

Salary circa £6,000

With good COBOL programming experience in an IBM installation who desires to progress further into systems analysis.

PROGRAMMER

Salary circa £5,500

We are looking for a Programmer with 1-2 years' experience of COBOL preferably in a financial environment.

SALARIES SUBJECT TO EXPERIENCE

The Bank is Australia's largest trading bank. The size of our operation in London, allows us to give our people a friendly place of work, with the flexibility to allow the use of Initiative with responsibility.

4 weeks' leave a year and after a settling in period, the kind of fringe benefits you would expect from a major financial institution, low interest loans, luncheon room, contributory pension arrangement, medical insurance, session ticket loans etc.

Applicants should contact John Halliday on 01-437 8711 Ext. 217.

Bank of New South Wales

(Incorporated in Australia with limited liability).

8 Backville Street, London W1A 2AB

SCOTTISH RECRUITMENT FEATURE



Advertisers are reminded that the next Computer Weekly area feature will be published on October 26 and will highlight career opportunities in Scotland.

Space reservation should be made as soon as possible.

Owen Kelly — Manchester — 061-872 4211

Eddie Farrell — London — 01-261 8097

Copy Deadline: PM, Friday before

Computer Professionals

Analysts-Programmers-Managers Come to California

Our client is a major international Bank, among the largest in the United States, with major computer centres in both San Francisco and Los Angeles. A management commitment to advance utilisation of state-of-the-art computing and telecommunication services in all aspects of the Bank's operations has created exceptional opportunities for outstanding people.

* Four IBM 3033's will be operational by next summer, supported by minis for internal timesharing and international funds transfer plus a statewide network being upgraded to run ACF/VTAM/NCP.

* Applications software is being developed for large-scale on-line pro-

Philip Smith

Manpower Consultants
85-87 Jermyn Street, London SW1Y 6JD

grammes leading to revolutionary changes in American banking techniques.

* Dedication to technical and professional excellence is exemplified by continued participation in programmes from concept to on-line use, giving the broadest experience to staff personnel.

Expansion of the computer commitment has created dozens of present and future openings. We will be conducting interviews in London soon.

Applications will be treated in STRICT CONFIDENCE throughout by us and our San Francisco associates. Please send full c.v., quoting ref 1002/CW, to Philip Smith:-

BOEING

need

Programmers Analysts Sales Staff

at Watford

Boeing Computer Centres, a subsidiary of the Boeing Company, is expanding its UK activities, which include batch, timesharing and mini computer bureaux. Because of our success we pay high salaries to good people.

All-purpose computer professionals are required with experience in programming or system analysis, or both. It would be an advantage to possess some knowledge or experience of accounting/financial packages. The positions offer involvement in a number of the following areas:

- Systems Development/Programming
- Customer Liaison and Consultancy
- Pre-Post Sales Support
- Standard Packaging Implementation
- Large ICL Mainframe.

SALARY CIRCA £6,000

Experienced Sales Staff are also required to meet the expansion in our business. They should have knowledge of accounting systems and preferably interactive processing. The positions offer a high basic salary plus commission, with a company car, and good promotional prospects.

Phone: B. R. Lock or H. Shopper, Watford 38321

BCC Boeing Computer Centres Ltd.

SI Martins House, 31-35 Clarence Road, Watford, Herts, WD1 1UA

BOEING need the best

Technical Support Staff

Rural Staffordshire

Our Operations Planning and Software Sections are looking for additional technical staff to complete their teams based at Burton-on-Trent.

Installation

Our current equipment is based around twin IBM 370/155's (under MVT/HASP/TSO) and a 370/148 with a nationwide TP network of 3270's under CICS. A 3032 is due in 1979 together with a mass storage system and will be run under MVS, with VSPC. Amongst other developments are the introduction of Distributed Processing using Series 1 minis, Database Systems, TSO and Personal Computing, and both Hardware and Software monitors for Performance Evaluation.

Operations Planning

The function provides general technical support and ensures the efficient use of operations resources covering hardware and procedural evaluation and implementation.

We are looking for people with an in-depth knowledge of IBM 370 operating systems - preferably with a systems programming background who have a practical knowledge of job control language and an understanding of operational practices.

Salaries up to £6,000

Operations Software Salary Package

This section provides a service to ensure the successful performance and availability of software and will involve the design, testing and implementation of in-house operating software. Here we need systems programmers with IBM Software experience in one or more of the above computing techniques. Above all applicants must be problem solvers, with the enthusiasm to develop their skills.

Location

Our Computer Centre is situated at Burton-on-Trent within easy reach of major Midland conurbations. Moderately priced housing is available in attractive local villages.

Please write or telephone for an application form to:-

Chris Scott, Personnel Officer,
Group Management Services,
Allied Breweries Limited, 126 Station Street,
Burton-on-Trent, Staffordshire DE14 1BZ,
Telephone (0283) 45320, Extension 2906 or
2008.



ALLIED BREWERIES LIMITED

BRITISH HOME STORES



Shift Leader £6,300 inc.

British Home Stores have a vacancy for an experienced Shift Leader to join their installation in Central London. Hardware consists of a 1 megabyte IBM 370/145 operating under DOS/VSE, POWER/VSE. A 3031 is to be installed in 1979. The environment is rapidly developing and this vacancy arises due to expansion to a 4 shift system. In addition to the excellent salary, BHS offer substantial benefits including:

- ★ Free lunches
- ★ Free life assurance
- ★ 20% shopping discount
- ★ Season ticket loan scheme

Successful candidates should have a minimum of five years' experience operating an IBM 370 under DOS/VSE.

If interested contact Carol McGovern on 01-836 6775

Computer Personnel International

110 St Martin's Lane, London WC2N 4BH 01836 6775

Operations Supervisor

£7,000+

Operations Team Leaders

£6,000+

Operators/ Data Controllers

£5,000+

we are
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we perform

we want
if you

one of the largest bureaux in the UK, expanding rapidly in all aspects of our work.

at Feltham, a recently installed 2970 running under VME B: 2 x 1904S, a 190MA and a 1902T using George 2 and 3, with MAXIMOP and a large communications network, utilising front-end processors. How's that for an installation?

work for over 300 customers, covering a wide variety of commercial applications and their development. You'd find it challenging here - your work could include both on-line running and off-line job preparation/ deassembly.

To recruit more experienced staff to cope with our dramatic expansion.

would like to find out more about those exciting opportunities please ring P.F. FERD STRODE 01-890 1414, any time, day or night, between 11.00 p.m. on Sundays and 8.00 p.m. on Fridays, or write to BARIC COMPUTING SERVICES LIMITED, FOREST ROAD, FELTHAM, MIDDLESEX.



An ICL/Barclays Bank Company

GEO. A. MOORE & CO. LTD.

PROGRAMMERS-IBM Series/1

c. £4750

We are a progressive furniture manufacturing company with a record of continual growth and investment, currently employing above 650 people in rural West Yorkshire.

The first phase of our long-term data processing plan has been completed with the successful installation of one of the first operational IBM Series/1 machines in Europe. We now wish to expand our in-house programming capability, to develop the new Series/1 Multi-Terminal system, operating under EDX into many other areas of the Company.

If you have over 2 years' solid programming experience, involving a high-level language and an "Assembler" type language, with possibly an intermediate knowledge of COBOL, and if you are able to make an immediate contribution to our plans, contact us.

Personnel Manager
GEO. A. MOORE & CO. LTD.
The Ashes, Wetherby, West Yorkshire, LS22 7DZ
Tel: Boston Spa 422554

GEORGE A. MOORE GROUP

**Dorset County Council
County Treasurer's Department**
NEW ICL 2976 INSTALLATION

PROGRAMMERS

Salary £3279 to £4832 (inclusive of super-
plement)

Dorset County Council are currently installing an ICL 2976 computer with a wide range of communications facilities.

Vacancies now exist for programmers, wishing to develop progressive COBOL programming skills by joining progressive project teams involving a wide range of batch/ off-line applications.

Applicants should have received basic training in program-
ming and should have gained at least one year's practical COBOL
programming experience. Knowledge of 2000 computer pro-
gramming language and/or assembly language is not necessary, training
will be given.

Applications to be submitted by 2 November 1978
to: The Assistant County Treasurer, County Council, Dorset
Hall, Dorchester DT1 1XJ, Telephone: Dorset 213111.
Fax: 0207 24116. Please quote reference TIC/CS/14.

Datasolve Database

We've made things easy for you!

If you're chasing a new job or a new contract, save time by filling in your application form here and now.

Personal Please write in ballpoint, using block capitals.

Surname _____ Forenames _____

Address _____

Tel. Home _____ Office (discretion will be used) _____

Age _____ Place of Birth _____ Car? _____

Are you prepared to relocate? _____ UK/Abroad (delete) _____

Experience Place no. of yrs. in box, e.g. IBM 360/370. 4

Machines Please specify model. **Applications**

IBM 360/370

IBM others (specify)

ICL 1900/2900

ICL others (specify)

Honeywell

Univac

Burroughs

PDP

Other mainframes (specify)

Communications

Data transmission

Central process.

Teleprocessing

MIS*ICPA*PERT*

Magnetic tape

Disk

Others (specify)

Job Titles

Project Leader

Systems analyst

Systems engineer

Analyst/programmer

Systems programmer

Programmer

Operations supervisor

Operator

Consultant

Sales representative

Others (specify)

*Delete where applicable

Position sought Please state briefly the type of appointment you are seeking.

Minimum salary £ _____ Notice required/Date available _____

Signed _____ Date _____

Cut out the whole advertisement and post to the address below.

Knight

Knight Computer Services Limited

Staff Services Division of BOC Database Group and a member of Computing Services Association.

Knight Computer Services Limited, 14 Old Park Lane, London W1Y 4NL

01-491 4706

24-hour answer phone

KNIGHT IS RIGHT

FOR RECRUITMENT 01-491 4706

01-491 4706

SENIOR SYSTEMS ANALYST & SYSTEMS ANALYSTS



We'll lay on a great welcome for you

North Thames Gas is developing a Customer Service computer system to achieve further improvement in the standard of service to our customers. We attach great importance to this project, and the people who make it a working reality will be highly valued. It is a real-time system running on Data General C330 minicomputers, with over 60 V.D.U.s and we are now looking for a SENIOR SYSTEMS ANALYST.

You will need at least 2-3 years' successful experience in implementing systems in a commercial environment, ideally including experience of the design of software in collaboration with software programmers. You will be responsible for the definition of system requirements in liaison with user staff at all levels, and for supervising a small team of Systems Analysts designing, specifying and testing the required system.

We also need a number of SYSTEMS ANALYSTS with a background in programming.

involving at least one year's experience in a commercial systems environment. If you wish to widen your systems experience then a career with North Thames Gas would be a wise move.

THE BENEFITS

The Development Centre for this system is in a pleasant building in Acton, West London, easily accessible by most forms of transport, and has free car parking nearby.

The salary range is £5553 to £7074 for the SSA and £5153-£6537 for the SA's and starting salaries will depend on experience. The many additional benefits include 25 days holiday entitlement, a first-rate social club and sports facilities which include squash courts, tennis and football.

This could be a very positive step forward in your career. We would welcome a call from you. Make the first move by telephoning Richard Toombes, Systems Manager, Minicomputers, on 01-993 0914, for an exploratory talk; or ask our Recruitment and Selection Office on Staines (01) 61666, extension 3282 for an application form; alternatively write to him in sufficient detail to make an application form unnecessary at: North Thames Gas, North Thames House, London Road, Staines, Middx. TW18 4AE. Please quote ref. B9108 for the SSA and B9082 for the SA positions.

NORTH THAMES GAS

PL/1 Programmers

A career challenge in program development

Footscray, Kent Upto £7,500

IDECL, the Software Development Centre of ITT Business Systems and Communication Group.

Our office in Footscray, Kent, involved in developing software support systems for the production and maintenance of products to be used by the group. The growth of this function has created opportunities for additional Programmers with PL/1 experience.

We need software professionals who relish the challenge of working in an environment which is dedicated to program development, and especially highly rewarded for their abilities.

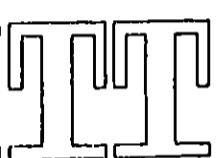
We recognise potential at all levels, good programmers with one year's experience can, in their twenties, right up to the seasoned writer are valued at the top of the ladder.

IDECL values your expertise and the salaries we are offering will fully reflect the importance of your role. Fringe benefits are those to be expected from a successful, progressive organisation and career advancement prospects are excellent.

If you are interested in broadening your experience with IDECL, then telephone Jeff Penny or John Diaper on 01-300 7788.

Alternatively write with brief career details to:

Personnel Department, IDECL, ITT Business Systems, Canada Lane House, High Street, Buntingford, Herts.

IDECL 
A Development Centre of
ITT Business Systems

Experienced ICL Programmers

The Solent Area

Our client, a leading international group in the petro-chemical industry, is looking for a computer programmer to join a small, friendly team at its head office in the Solent area.

The position offers a young man or woman the scope and opportunity to develop some two years' experience of COBOL on their newly installed ICL 2904, within an informal environment, whilst enjoying the benefits of a large organisation.

A knowledge of ICL software will be essential, and your duties will include the maintenance of library files.

Write in the first instance with details of age and experience to Ian Fleet, at the address below, quoting ref: E12812. Do not separately any companies to which your application should not be forwarded. All replies will be answered.

B&B CONFIDENTIAL REPLY SERVICE
Benton & Bowles Recruitment Limited,
197 Knightsbridge, London SW7.

This progressive Company, manufacturing electric road vehicles and industrial trucks, urgently requires an experienced

PROGRAMMER/ANALYST

To manage and develop systems on an on-line/minicomputer installation in South Wales.

Salary offered £. 15,800.

Apply in writing to —

Mr H H Clark, Director

at the below address, or if preferred an informal out of hours enquiry may be arranged to discuss this opportunity by telephoning the number below.

CROMPTON ELECTRICARS LIMITED
CROWN AVENUE, CROMPTON, TEL: 0304 821201
A HAWKER SIDDELEY COMPANY

UNIVERSITY OF SOUTHAMPTON
USER SUPPORT
PROGRAMMER

Applications are invited for the above post in the Computing Service. The facilities to all teaching and research groups for batch, multi-access and timesharing computers. These are based upon a large scale ICL 2970 system and a 128K PDP 11/745 computer locally with associate processors connected via a local network to remote computers such as CDC 7600.

The successful applicant will be expected to advise and support users on the effective use of the large range of local and remote facilities available. Some experience of the ICL environment would be an advantage but it is more essential to have an appreciation of user problems and to be able to communicate effectively with people at all levels.

Applicants should normally possess a degree or equivalent qualification and experience would also be considered. The appointment will be on the salary scale £3083-£3564 or £3683-£5555 according to experience.

Further particulars may be obtained from Mrs. P. Vaughan-Smith, The Secretary, Department of Computer Science, to whom applications should be sent by 3rd November, 1978, please quote reference 1028/A/CW.

THE UNIVERSITY OF LANCASTER
COMPUTER SERVICES DEPARTMENT
APPLICATIONS PROGRAMMER

A vacancy has occurred in the User Services Section for a programmer to maintain and support Applications Servers for users in the North West Universities Network. A Degree or equivalent qualification is required and preference will be given to a person with experience in a research environment, possibly as a user. Salary on the scale £3083-£3555.

Further particulars may be obtained (quoting reference L.83/A) from the Establishment Officer, University House, Lancaster LA1 4YQ. A copy of the application form (5 copies) naming three referees, should be sent not later than 23 October 1978.

Datasolve Database

Luxembourg Contract Cobol Programmers required with:

Practical experience of
ICL2960/70/80

COBOL + VME/B+

Knowledge of **IBM COBOL+JCL**

Positions also available for
Candidates with experience of
IDMS, PL1, APL, FORTRAN, IBM ASSEMBLER.

CONTRACT DURATION OF
3-12 MONTHS

ATTRACTIVE REMUNERATION

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CALL **RICHARD KALUZYNSKI**
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MINIMUM TWO YEARS' FORTRAN EXPERIENCE

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EXPERIENCE

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ON 01-491 4706

Knight

Knight Computer Services Limited,
14 Old Park Lane, London W1Y 4NL
Staff Services Division of BOC Datasolve Group and
a full member of Computer Services Association.

01-491 4706

KNIGHT IS RIGHT
FOR RECRUITMENT 01-491 4706

Knight

DATA
SOLVE

Accord Computer Efficiency

Amsterdam based Business Consultant £15,000-£25,000

Accord's business is providing a comprehensive personnel consultancy for clients in Western Europe. This includes:

- 1 Contract personnel for short/long term assignments
- 2 Specialist recruitment assignments tailor-made for individual clients
- 3 Advertising and P.R.
- 4 Marketing and sales facilities

We now wish to recruit a progressive and successful individual who must have a proven record of significant achievement in at least two of the above areas within the D.P. industry. Our growth to date has resulted in a profitable and highly respected organisation with a secure and established client base.

We intend to include one or two additional consultants who, by their own contribution and involvement in our expansion plans, will benefit not only financially, but by being a vital part of a positive and enthusiastic success story.

A substantial basic salary of about £10,-£12,000 will be negotiated and a commission scheme designed to more than double this income will be discussed.

Our base is in the financial centre of Amsterdam where cost of living is about 40 per cent higher than London, compensated by substantial tax concessions.

Telephone Bill Seymour at your first opportunity for further details and a totally confidential discussion.

Holland Mini Computer Software £16,000+benefits

The consensus of opinion in the computer industry is that Mini and micro-computer systems, during the foreseeable future, will be more widely used and universally accepted in all areas of Computer Technology.

Europe's leading software design and implementation organisation, which has an outstanding reputation in the technical, telecommunication and scientific systems fields wish to recruit a significant number of Programmer/Analysts, Consultants and Senior Consultants experienced in the following

- Real-Time Systems
- On-line Systems
- Message/Packet Switching
- Network Design

Conditions of employment and career development opportunities are excellent. Relocation costs will be met by our client. Interviews will be arranged in London during the end of October and beginning of November. Telephone Bill Seymour on 01-580 3754 for further details in total confidence.

Accord Computer Efficiency Ltd

580 3754

Portland House
4 Great Portland Street
London W1N 5AA England
Tel: 01-580 3754
Telex: 261134

European Office
Sarphatistraat 30
1018 GL Amsterdam
Tel: 020 264664/264082
Telex: 10430 ACE NL

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MYRIAD APPOINTMENTS LIMITED

Computer Personnel Consultants

PROGRAMMERS

SLough

To £5000

Our Client, a busy engineering company, is currently developing several on-line real-time applications.

If you would like

- * To receive training in advanced IBM software.
- * Develop COBOL programs involving database and TP systems.
- * Work on a variety of applications projects.
- * Five weeks' holiday a year.
- * Excellent starting salary and conditions of employment.
- * To join an active sports and social club.

— and you have a minimum of 12 months' COBOL programming experience, then this could be a good opportunity to accelerate your career.

Ref. W1/1810

RPGII

To £7000

Your RPGII experience is of great value today and tomorrow. System 32/34, ICL 2903/4 are carrying the language into the future.

Our client not only recognises this value but is also able to utilise your experience to provide a challenging working environment where your capabilities will be put to the test and where work is an on-going process of improvement. Whether you have one year or five years' experience a position exists for you, where you will always be important and where you can expect to progress rapidly to project leadership. Salaries up to £7000, working in and around London, are realistic but the ultimate rewards are far greater.

Ref. W2/1910

£6000 FOR 370 SENIOR PROGRAMMER

HERTS... MIDDX.

Our client, keen to retain their competitive edge and not remain stationary because of staff shortages, realises the value of technically skilled professionals and rewards them with both development projects, attractive salaries and training with the latest software products.

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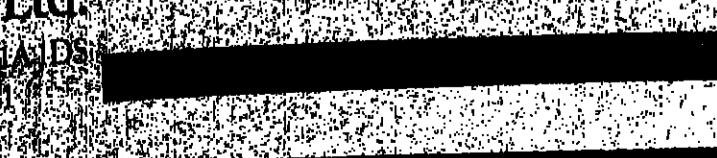
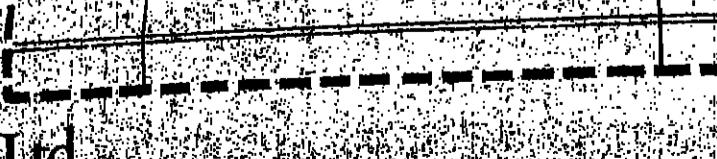
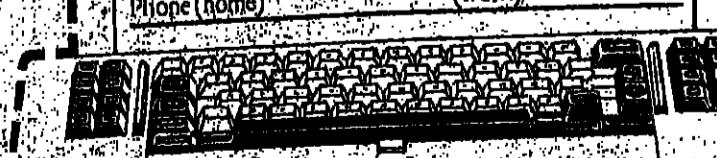
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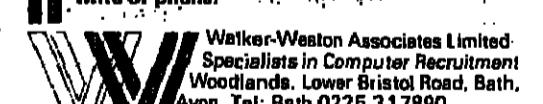
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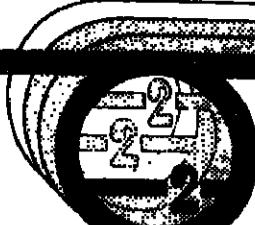
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Kellogg's, the world leader in the ready to eat cereals industry, is looking for a Senior Systems Analyst and an Analyst/Programmer to join their subsidiary company in Sydney, NSW. The company uses an ICL 2904 and DEC mini computers. The system is to be improved in 1980 and the staff is being expanded to meet this future requirement.

The Senior Systems Analyst is to act as a Project Leader and should have at least five years system design/analysis experience. Those with experience of financial and production applications will have an advantage. Age around 25/35. Salary £12,000 pa.

The Analyst/Programmer is to be a member of a project team and initially will be the Senior-Programmer. Two years' experience of COBOL is essential. FORTRAN is desirable. Age around 22/28. Salary £8,000 pa.

In addition to the salaries mentioned above, the total remuneration package includes relocation costs to Australia for applicants and their families. Preliminary interviews are to be held in UK from about 13 November and final interviews in London from 20 November 1978.

Candidates, male or female, should write for a personal history form and further details, quoting reference MCS/5020 (Senior Systems Analyst) or MCS/5021 (Analyst/Programmer), to Roland Orr, Executive Selection Division, Southwark Towers, 32 London Bridge Street, London SE1 9SV.

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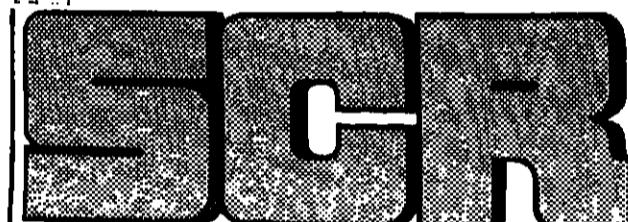
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Due to the success of our recent Operations recruitment campaign, our client, THE WELLCOME FOUNDATION, has decided to further enhance their team to cope with the development of computer operations within the group. This development follows the successful introduction of 2 x IBM 370/148s with the operating systems and IMS under the control of OS/VS1 and VM 370. Extensive communications equipment includes local and remote VDUs, typewriter terminals and RJE facilities throughout the U.K. It is a highly sophisticated operation certainly one of the most advanced in the country.

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SDI, the world's largest independent supplier of computer systems software, is out to identify the top four Assembler Programmers in Britain. Start this test of your skills and knowledge by taking part in this quiz compiled by SDI experts at our IBM equipped Research and Development Centre at High Wycombe. It is not easy — but the extent of your knowledge could surprise you — and only the best can become one of the four ultimate winners.

QUIZ DETAILS

The quiz is in two parts. Part 2 will be used as a "tie-breaker" if more than four people have top marks for Part 1. The criteria on which Part 2 will be judged are speed of execution on SDI's IBM 370, economy of code and maintainability. Answer the questions to Part 1, complete the details requested and post this page, together with your code for Part 2, to SDI, PO Box 84, High Wycombe, Bucks, to arrive not later than Monday, 30th October, 1978. The winners will be announced in this publication on the 9th November, 1978.

QUIZ

Part 1

a) How would you obtain the address of a partition's own communication region?

b) In what order is the Label Information Cylinder searched by the standard DOS or DOS/VS open routines?

c) An entry is deleted from the channel queue at the time the supervisor executes a SIO for the relevant CCB. True or False? (please give reasons)

d) CSECT1 CSECT
BALR 12,0
USING *12
LA 2,3
XL *8
BE LABEL2
EX 2, LABEL3
BALR 3,0
BCT 2, LABEL1

LABEL2 EOJ
LABEL3 CLI LABEL3+1,4

i) What does general register 2 contain at EOJ?

ii) What does general register 3 contain at EOJ?

iii) What does the instruction at LABEL1 look like in object form at EOJ?

iv) What other instructions have been modified during execution of the above code?

e) What would be the effect of attempting to execute the following instruction
RDD 0,1
as:—

a) The first instruction of a problem program running under DOS on an IBM 360 CPU with the direct control feature installed.

b) The first instruction of a logical transient loaded into the logical transient area by a problem program running under DOS on an IBM 360 CPU with the direct control feature installed.

c) The first instruction of a problem program running under DOS/VS on an IBM 370 CPU with the direct control feature installed.

d) The first instruction of a logical transient loaded into the logical transient area by a problem program running under DOS/VS on an IBM 370 CPU with the direct control feature installed.

Part 2
Write a sub-routine that will reverse the order of the bits in a byte. The sub-routine is to be called using standard IBM calling conventions. The address list passed by the calling program will contain one entry which is the address of the target byte. The sub-routine is to be written using IBM Assembler Language and should be capable of executing under DOS on an IBM 360 or DOS/VS on an IBM 370. The size of the sub-routine must not exceed 108 bytes. The code must allow for any value to be contained in the byte whose bits are to be reversed.

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THE SALES BIT

The user must understand disciplines

SO there I was, having experienced the dubious pleasures of a 5.30 a.m. breakfast and the completion of a 180-mile journey before 9.00 a.m., strolling through Hyde Park in the hope of finding the entrants for the Sunday Times "Fun Run".

Slowly but surely, and almost too late to get to the start, we edged towards the door of the entry control.

It is at this point, I should mention, that runners could collect their numbers any time within two hours of the start of their particular event, and therefore the queue could involve as many as 5,000 people at a given time.

The design of the data entry system was remarkable. The input device was a "garden-fete" marquee with a single door about ten feet across through which participants had both to enter and exit — over 11,000 in all.

I leave the rest to your imagination. Frayed tempers, mild hysteria, crude derision and more than a little jostling. Why not enter at one end and exit at the other? Too simple, perhaps!

Meanwhile, back at the ICL computer centre, close to its inevitable conclusion, "Of course it's a bloody shambles, they're using a computer."

I guess I have been drawn into that particular verbal vortex too many times to want to make the received all the input they required, but if they did, it was certainly not in the form they had originally anticipated (they were working under handicap right from the start).

I have seen this kind of situation so many times before, where the efficiency of computer systems has been degraded simply because the user does not appreciate the need for discipline matched by efficient systems that are simple in conception and practical in application, based on methods which have been thought through and tried out on a dry-run basis.

To compute inefficiency is to compound it.

Salesmen and systems analysts alike must constantly be aware of their responsibility to ensure that the user truly understands the role he has to play in the effective application of a computer-based solution. There must be a complete understanding of the disciplines involved and the need for order and consistency.

This book has been written to help people in business to build financial models for use on their computers. The author clearly has a sound knowledge of the subject area but many readers will find the text difficult to understand. Few concessions have been made to the practical business reader, especially where the author has indulged in academic areas.

For example, there are far easier ways of explaining cost/volume/profit relationships than the student text book approach of 'comparing accountants' and 'economists' models'. The standard diagrams used are useful for examining fodder but have little use in a practical business setting.

However, the book offers a lot of sound practical advice and would be a useful reference text for accountants and systems analysts concerned with systems development.

PAUL NORRITT

Puzzle answer

A BATCH of 27 coins is the largest that can be catered for. One method of identification is:

Put one coin aside, and label the others 1 to 26. Then weigh 1(A) and 2(B) against 3(C) and 4(D). If A and B are heavier, then 1(A) and 2(B) are the faulty coins. If C and D are heavier, then 3(C) and 4(D) are the faulty coins. If A and B are lighter, then 1(A) and 2(B) are the good coins. If C and D are lighter, then 3(C) and 4(D) are the good coins.

Analysis of the three results will always reveal the identity of the light coin.

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Southern Water



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London SW1

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Ascii through the Logic Gate

An epic in 32K words, by Richard Forsyth

Block 18 (Unblocked)

After the gallant Puffdown has fallen to his death, Hex and Cleo waste precious time in a blazing row. Meanwhile, in the crater and elsewhere, things are hotting up.

BY now the air was thick with sulphurous fumes. The geyser had died down, but in its place had come earth tremors recurring every few minutes. Even if Hex had possessed a rope it was clear that he could never have climbed down into the crater to get back the black box and hoped to return alive. It was high time to depart.

Their next objective was Sprocket's Hole where they intended to take the decadent androids' syllogistic acid and use it to spread chaos over the Network. For safety, they split into two groups and that meant, the way feelings were running, Hex and Asci in one and Cleo, Lambda and Zap in the other.

They set off down the hill, Hex and Asci taking a more easterly route. Soon their two paths diverged.

As they walked, Cleo pondered. After about an hour's travelling she asked Zap: "What was so special about that black box? Was it really going to revolutionise the world?"

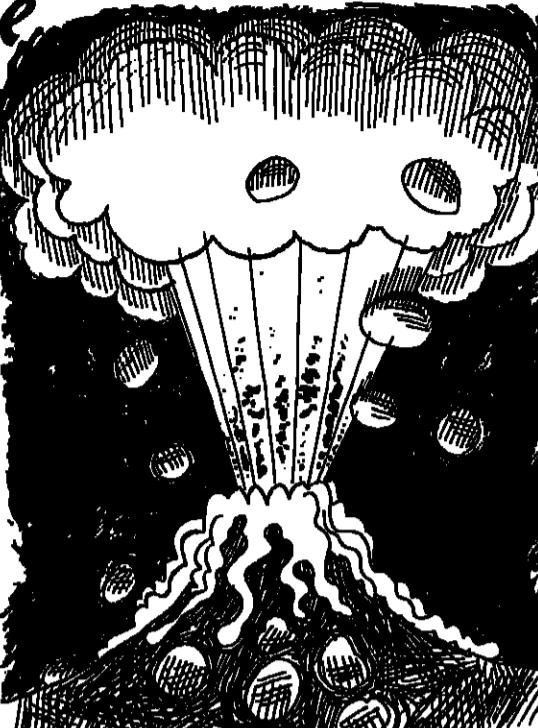
"Well, I think Hex was over-selling it a bit; but it did have some remarkable features, especially in the area of concurrent processing."

"Concurrent processing?" "Yes. I mean we've all heard of shared file access," he replied (Cleo hadn't but she didn't contradict him) "and we know all about co-routines, time sharing, multi-threading and so on, but the M5 took it a stage further. When we were tied up to that thing we weren't just exchanging information, we were sharing experiences. I don't mean DMA either," he added.

"I'm so glad you don't mean DMA," said Cleo. DMA meant nothing to her.

"DMA stands for direct memory access," explained Lambda. "Zap's point is that it was more than simply a memory-to-memory transfer."

"It certainly was," he went on. "Our consciousnesses actually interpenetrated. An idea that started in one mind would be developed by another. It's not the kind of experience you forget in a hurry. That's why we freaked out."



"And that's why Hex got so steamed up about it," put in Lambda.

"Yeah," mused Zap. "I remember when Igor Gigotski came to lecture to us. He said that Calculo Ergo Sum (I think, therefore I am) was the ultimate ego-trip, and he was right. The irrefutable existence of other minds as raw sense-data — it's a bit hard to take. A thing like that could blow the System wide open. It wouldn't fit the conceptual framework. The whole edifice would crumble if its own accord. All you'd need to do would be to hook a few of those machines on the Network and leave the automata to draw their own conclusions."

"You mean the System is too rigidly centralized to withstand distributed intelligence?" asked Cleo, with her tongue pressing only lightly against her cheek. The jargon was catching.

"DMA

stands for direct memory access," explained Lambda. "Zap's point is that it was more than simply a memory-to-memory transfer."

"Something like that," he responded. "The M5 was heterarchically organized around a matrix of holonic processors with bisociative memories. According to all that I've read, holonic processors are theoretically impossible, and the same goes for bisociative memory; yet we've just had a demonstration. I suspect the System has pushed

it up because it endangers orderly functioning." "A holonic processor," Lambda added for Cleo's benefit, "is one which promotes the intersection of two or more trains of thought. Bisociative memory allows stored data to interact according to non-deterministic rules. Basically they are two facets of the same thing; you couldn't have one without the other. The great thing about the M5 was that it solved the co-ordination problem."

"The pity of it is," a sulky Zap carried on, "that we could easily have whipped out the main chip and slipped it into one of our pockets. The rest was just what we configured around it; we could have done that again later."

"But we were too intent on self-preservation," said Lambda.

"So all we've got left now," said Zap, "is my little binary chopper."

"What's that?" inquired Cleo.

"It's like Occam's razor, only sharper. It divides and conquers."

Their conversation was ended by the shock of an earthquake. The volcano had finally erupted. Behind them the night sky was lit up by garish orange flames. It seemed that the whole horizon was on fire. A cloud of dense black smoke billowed over the landscape, blotting out the stars. When they discerned tongues of red-hot molten lava spilling out over the edge of the cone, they knew it was time to get moving again, fast.

They pressed ahead at Cleo's best pace and by daybreak had come to Sprocket's Hole, which they approached with extreme stealth since they knew of the androids' extreme stealth.

The still where Sprocket and Bootstrap refined syllogistic acid according to their secret recipe was in the smaller hut, along with vats in which it was stored. They were not too concerned about overpowering the androids and getting at the stuff, but were worried whether there would be enough.

If there was only a small quantity, they would have to force the makers to divulge the method of making it and, even if they succeeded, that could involve a lengthy fermentation period.

When Hex and Asci had not turned up by noon, the appointed hour, they decided to take the place by storm. Zap marched to the door, kicked it open, and charged in wading his binary chopper.

A scene of devastation greeted them. Sprocket's body lay on the floor, his flesh already pungently decaying and his metal parts starting to rust. Further inside Bootstrap was alive but frozen in a state of suspended animation.

Having appraised the situation and found that stocks of syllogistic acid, which had evaporated, were low, they dragged Sprocket outside for the vultures.

"There's only one thing for it," stated Zap, "we'll have to revive the other android so he can make some more for us."

Where are Hex and Asci? More trouble next week.

— 1978 Richard Forsyth, Kair Timesharing.